THE

INDIAN AGRICULTURIST,

WEEKLY

Journal of Indian Agriculture, Mineralogy and Statistics.

VOL. XI.

CALCUTTA:
PRINTED AT THE "STATESMAN AND FRIEND OF INDIA," OFFICE.

1886.

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VOL. XII.] CALCUTTA :—SATURDAY, JANUARY 1, 1887. [No. 1.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 22ND DECEMBER 1886.]

Madras.—General prospects fair.

Bombay.—Slight rain in parts of the Deccan and southern Maharatta country. Standing crops slightly damaged by rain and blight in parts of Ahmednagar and Bijapur, but in good condition elsewhere. Fever in parts of twelve, cattle-disease in parts of ten, and small-pox in parts of two districts.

Bengal.—No rain fell during the week. Weather seasonably cold. *Amun* harvest is in full progress, and is generally expected to yield well. *Rabi* and poppy crops generally promise well. No marked change in price of rice since last week. Public health improving, but fever and cholera are still prevalent in many places.

N. W. Provinces and Oudh.—Weather clear and cold. Slight showers in some places, but more rain required in Northern and Western districts for the *rabi* crops. Prospects continue favourable. Markets well supplied and prices generally steady. Public health fair.

Punjab.—No rain : rain much wanted in Umballa, Jullundur Ferozepore, Sialkot, Lahore, Shahpur and Peshawar districts. Small-pox prevalent in Peshawar, elsewhere health good. Prices rising in Amritsur, Sialkot, Lahore, and Rawalpindi districts. Fluctuating in Delhi and Mooltan. Stationary elsewhere. Rabi sowings nearly completed.

Central Provinces.—The *rabi* crops are doing well ; linseed slightly damaged by clouds in Bilaspur. The threshing and harvesting of *kharif* crops continue. Fever prevalent in a few districts, prices generally steady.

Burmah.—Slight cholera in parts of eight districts. Several deaths in Akyab town, one in Rangoon and five in Thayetmyo district. Fever in Kyoukpyu district. Cattle everywhere healthy. Harvest progressing. Slight damage to crops from rats in part of Pegu district. Prospects good.

Assam.—Weather seasonable. Reaping of *sali* still in progress. State and prospects of the crops good on the whole. Gathering of *matkalai* progressing. Cholera abating. Public health fair. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Prospects continue favourable. Public health good. No material change in prices excepting in Hassan, where they have fallen.

Berar and Hyderabad.—Weather clear and cold. Cotton picking and *kharif* harvesting continue. *Rabi* crops in good condition. Harvesting of *abi* crops concluded : *tabi* crops continue to be sown. Fever and ague prevalent in the district. Prices steady.

Central India States.—Weather clear and seasonable. Health and prospects good. Opium crops being sown. Prospects good, Fever in places; otherwise public health good. Prices steady.

Rajpootana.—Weather seasonable. Slight showers in places. Tanks and wells drying in many States. *Rabi* crops all sown and doing well, though irrigation of them has already commenced. Prospects generally good. Fever and cholera prevalent in Bikanir, otherwise public health good. Prices fluctuating.

Nepal.—No report.

Editorial Notes.

THE first report on the prospects of the linseed crop in Berar states that the acreage is below that of last year, which was 621,000 acres, owing to excessive rain-fall at the time of sowing. The crop has suffered generally from untimely rainfall and blight ; and that on the whole not more than a ten or twelve-anna crop is expected.

THE first report on the prospects of the wheat crop and the outturn of the jowari crop in Berar states that the acreage under wheat is above the average, which is 807,000 acres. The crops are a foot high, and generally in excellent condition. So far we have every promise of a good average crop. The outturn of jowari (or great millet), the staple food of the people, is estimated as quite up to, if not above, the average.

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WE are informed that the village community of Anguna, in Portuguese India, has offered a reward of Rs. 500 for the best essay on agriculture ; and to test its practical value, a free plot of ground is to be placed at the disposal of experts to experiment upon. This is as it should be, and displays a laudable desire on the part of the community to encourage the study of agriculture. The example might be copied with advantage in other parts of India.

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IT would appear that Java and Ceylon are not the only rivals of India in the growth and manufacture of tea. Hawaii is spoken of as a possible rival, as experiments have been carried out with plants from India and Japan, the best results being obtained from the latter. These experiments have led to a project for the establishment of a tea plantation on a large scale on the Island, where tea is to be manufactured for importation to Europe and America.

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THE official report on the prospects of the rice crop in Burmah for November 1886 is as follows :—"The area under rice is now reported as 110,223 acres over last year's area, or an increase of 3·4 per cent. The weather has been seasonable throughout November and favourable to the crops, except in parts of Tharrawaddy and Amherst, where the rainfall was scanty. The crop is reported as over an average crop in Akyab, Pegu, Prome, Thongwa, and Shwegyin, and a full average crop in Amherst; in Hanthawaddy, Tharrawaddy, Henzada, and Bassein it is slightly below a full average crop. Provided no serious injury is caused by late rains or other unforeseen occurrences, the exportable surplus will probably amount to about 1,100,000 tons."

LAST week we had something to say regarding the use of sugar and molasses in boilers to prevent incrustation. The following on this subject, from the *Sucrerie Indigène* is translated from the *Chemiker Zeitung*, one of the principal German authorities on chemical subjects :—"It is known that the prolonged presence in water used for feeding boilers of considerable quantities of sugar, leads to dangerous corrosion ; for at the temperature corresponding to a pressure of four or five atmospheres, sugar soon gives off strong acids, chiefly formic acid, which energetically attack the sheet iron of boilers, and corrode it through and through in a few months, and even in a few weeks. There is thus reason to formally dissuade people from

using sugar as a disincrustant in steam boilers; for such a disincrustant would not limit itself to keeping in solution the deposits which it was desired to eliminate or to prevent, but would end by dissolving the boiler sides themselves."

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THE *Produce Market's Review*, makes the following remarks regarding the present state of the cane sugar trade :—"That the production of cane sugar generally is profitable even at the present low prices, would seem to be shown by the fact that the yield this year will probably be in excess of that of each of the last three years. It is admitted that the present, season in many tropical countries has been extremely favourable for production, and from the estimates formed of the yield, it is evident that growers of cane sugar have not yet given up competition with their gigantic rival, beet sugar, nor indeed has there ever been any real reason for them to despair of eventually successfully competing with beet. All they have to do is to adopt modern scientific methods, and the foreign bounties, which in any case cannot last long at their present extravagant rate, would assume their real aspect, which is one of relatively trivial importance. Although Herr Licht has again raised his estimate of the new beet crop by 50,000 tons, prices have not given way, and indeed speculative sales have been made at an advance on last week's quotations."

REFERRING to the state of the trade on the Continent, especially in France, and the effect of the bounty system, the same paper says:—"The deplorable state of the finances is causing a great deal of difficulty in the French Parliament, but no definite proposition has yet been made as to the sugar bounties, though it appears probable that any alteration that may be made, will only date from after the termination of the present beet season in August 1887. In speaking last week of the bounty as calculated by M. Wilson being 10*s*. per cwt., the context implied that this was only on the quantity exported. The bounty on the total weight of sugar grown in France would be equal to one-third of this, or 3*s*. 4*d* per cwt. A similar state of things exists with all the continental bounties. For instances, if the German production of beet sugar, which is what has hitherto threatened our colonists be 1,000,000 tons this year and the bounty be 2*s*. per. cwt on an export of 500,000 tons, the bounty spread over the whole production is only 1*s*. per cwt,—a very trifling matter. Our West Indian planters as a rule, still throw away 2*s*. to 2*s*. 6*d*. per cwt. in loss by drainage on the voyage and on unnecessary charges which can be readily avoided by those who have a command of money. This it will be recollected is after extracting as sugar, only one-third of the saccharine in the cane, and after producing that modest yield in such a state, that it fetches 3*s*. to 4*s*. per cwt less than it would if it had been properly made. As a matter of fact the foreign bounties are of no importance whatever to our West Indies, and their entire abolition would make no appreciable difference to them. They are no doubt useful as a cry to those who are desperately striving to keep up a completely obsolete system, but it is greatly to be regretted that for the last twenty years, the colonists have not seen through such a very transparent agitation, and set to work to apply the true remedy for their condition, by getting proper machinery, so that they might double the net money yield from their estates."

AT the distribution of prizes a few days ago, the successful students of the Bangabasi school of Agriculture, the Hon. W. W. Hunter, in his address reviewing the work and progress of the institution said :—"There is one branch in which success has not yet been obtained, namely, in the agricultural teaching. This school has opened its doors to all who desire a scientific training in the one great trade of the country, the cultivation of the soil. But the response so far has been a very feeble one. How far this is due to the fact mentioned by your secretary, that agricultural subjects have no place in the ordinary public examinations of this country, and how far the state of things can be remedied by a change in the system of our public examinations, I am not prepared at present to say. But of two things I can assure you. First, that technical education is at this moment receiving the earnest attention both of Government and of the University; and second, that in any true scheme of technical education in a purely rural country like India, a leading part must be assigned to agriculture. On the other aspect of the case, and especially with regard to the agricultural education of the sons of the landholding and landmanaging classes, I shall say nothing. For at my right hand sits the highest authority in India on the subject, Sir Edward Buck, who will speak to you with a fuller knowledge and with a more matured experience than I possess."

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WE are glad to hear that Mr. W. Wilson's ostrich farm at Delhi has been making good progress during the past year. We are informed that the young brood, incubated last year, have thriven wonderfully well, and Mr. Wilson's venture seems now to be an assured success. The farm has been removed to a more secluded locality in the interior of the district, where the birds have the benefit of fresher air and more exercise, and, being naturally of a timid nature, are less liable to be disturbed by visitors and sight-seers. "From what I have been able to learn," writes a contemporary's Delhi correspondent, "Mr. Wilson has not yet derived any profit out of the business, but he has managed to meet all his expenditure on feed and keep, from the income obtained from the sale of feathers. Next year it is his intention to begin selling off the indigenous stock and reaping the fruits of his labour. Mr. Wilson would appear to have studied the subject with much care and attention, and his farm well repays the trouble and expense of a visit. The grounds are clean and neatly kept, the birds well and comfortably paddocked, and there is plenty of room to exercise. The jackals have been giving much trouble, and have succeeded in carrying off some of the young birds, but Mr. Wilson has had his revenge: between four and five hundred jackals having been poisoned by him within the past year," This is the only farm of the kind in India, and should it prove a financial success, as we have every reason to believe it will, there ought to be others embarking in the same enterprise

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 22nd December 1886.—There has been slight, but seasonable rain during the past week in the Madras Presidency and the Deccan, and local showers in Central India, Rajpootana, and Hyderabad. Some damage has been occasioned by the late heavy rains in a few districts of Madras and Bombay, while in the western districts of the North-Western Provinces more rain would be beneficial, but on the whole the *rabi* crops are in good condition and promise well. In the Punjab rain is much needed to complete the *rabi* sowings. Harvesting of the *kharif* crops continues in progress in the Bombay districts and Hyderabad, and the winter rice is being reaped in Burmah, Bengal and Assam with prospects of a fair outturn. Elsewhere the autumn harvest has been completed. Prices are rising in parts of the Punjab, and are generally steady elsewhere. Cholera and fever are still prevalent in Bengal, though less severe, and small-pox exists in Madras, Bombay, and at Peshawar. Elsewhere the public health is fair. Cattle-disease is reported from Madras, Bombay Burmah and most of the other provinces, but is nowhere serious.

THE irrigation returns of the Madras Presidency for 1884-85 show that the total irrigable area is over 5 millions and 90 thousand acres, or a small decrease as compared with the figures of the previous year. Of this over 92 per cent was under occupation in the year under notice, and over 4,300,000 acres were effectively irrigated. Of the total occupied area 79 per cent was Government land, 18 per cent *inam*, and 3 per cent zemindari. The gross revenue amounted to over 2 crores and 16 lakhs of rupees, or an average of Rs 3-14-1 per acre. But taking only the revenue charged on first-crop lands, and excluding the area irrigated free of charge in zemindaries, (55 per cent) the average amounts to Rs. 4-4-5 per acre, of which 30 per cent, or Re. 1-8 per acre roughly represents the land tax, and 70 per cent, or Rs 2-0-9 per acre, the charge for

water. Compared with the preceding year, the gross revenue shows a decrease of Rs. 2,90,743, owing chiefly to the falling off in the second-crop area, while the remissions granted amounted to Rs. 10,33,299 or Rs. 8,67,524 more than in the preceding year. The figures we have quoted cannot, however, be taken as perfectly reliable, as the *jamabundi* and irrigation accounts are not found to agree very well with the areas irrigated. But an attempt is to be made next year to remodel the forms, and better results may be expected.

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It would seem that savages, as we understand them, have a far more intimate knowledge of the mysteries of nature and the hidden virtues of herbs, than we who boast of a progressive civilization. Thus, to quote a recent and familiar instance, we have the *Erygthroxylon coca*, the wonderful properties of which were known to the South American Indians from time immemorial. Now we have been made acquainted with a liqueur, prepared by the Fijians, possessing remarkable properties, and which, (if all we hear of it be true), will be hailed by civilized countries as a perfect God-send. An English exchange gives us to understand, that among the products of a purely colonial character which the Colonial and Indian Exhibition has familiarized us with, the Fijian Kava Schnapps, which has been retailed at the Colonial Bar, during the past six months,bids fair to quickly attain a popularity no less permanent than widespread. The new liqueur possesses apparently every possible quality to recommend it. Its valuable medicinal properties—testified to by professional experts of unimpeachable repute—are only equalled by its particularly palatable character, while the permanent exhilaration it produces, with the absence of any unpleasant after effects, places, it must be admitted, rather a dangerous premium on its consumption. To those interested in the products of our Colonies—especially those directly concerned in or connected with the welfare of the "Coral Lands" on the South Pacific, some information as to the origin and manufacture of this remarkable liqueur may be acceptable.

Prepared as regards its active principle from the root of the *Piper methysticum*, a species of pepper, called by the natives of Fiji "Yagona," Kava in its primitive form is the national drink of these South Sea Islanders, among whom its splendid qualities have been held in high esteem from time immemorial. Indeed, it is said, that the Fijian and Samoan people owe their robust health to its constant use. It is claimed on behalf of Kava Schnapps—very positively by those who have put it to a practical test for some length of time—that it regulates in an admirable manner the action of the internal organs, it possesses remarkable soothing properites, it is a health stimulant, an unrivalled brain feeder and a wonderful restorer of faded energies and of exhausted nerve power. Its gently exhilarating non-intoxicating properties render it peculiarly suitable for the use of those engaged in heavy intellectual labour. And when, in addition, it has proved itself a preventive of gout and rheumatism and as a diuretic unsurpassed, imparting freshness and purity to the blood, it will be easily understood that its more enthusiastic admirers have gone so far as to describe it as a veritable elixir of life.

In reference to the appearance in England of the Hessian fly, the *Pioneer* sounds a note of warning on the danger of importing this pest into India. Our contemporary says :—"The question which most concerns us here is how to prevent the first introduction of the evil. In England the importation has been assigned to the straw brought over for paper manufacture, and to the "tail" or feed corn, the sweepings of the holds of ships, granaries, and store-houses. Indian ports are hardly likely to suffer from these causes; but the agency and material of infection of all kinds are so extremely obscure, that a note of warning may not be ill-timed. Fortunately we are not at present concerned with remedies or with the treatment of infected crops; but it may be noted that the Americans have displayed characteristic ingenuity in circumventing the fly and keeping its ravages in check. They have discovered that it has five natural enemies or parasites, which have been encouraged and enlisted into a kind of salvation army, with results which must rouse the envy of General Booth and his not less zealous [asso]ciates." At any rate, it is just as well to be on our guard here.

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Those who have devoted their time and attention to the study of the laws which govern the absorption by the soil of moisture from the atmosphere, as well as the exhaustion of moisture from the soil by plants, will be interested in reading the views of Dr. G. C. Caldwell of Cornell University on the subject. He says :—"Too much credit is given to the power that the soil is supposed to have of absorbing moisture from the atmosphere; the amount so absorbed is of small account except when the air is very damp, which is not its usual condition at such times when rain is scarce. The power residing in the plant itself of reducing its consumption of water is of much more account for saving it from death by drought than any power which the soil has of supplying it with water by simple absorption from the air. Some plants can if necessary lower the rate at which they take up water by their roots and give it off into the air to one-tenth of the usual rate without showing at least for a time, any signs of suffering; and when the supply of water at the roots is more liberal they pump away again as fast as ever."

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To prevent this exhaustion of moisture by the roots of plants, as well as to enable the soil to absorb moisture from the atmosphere, it has always been the practice to stir the soil deeply, and apply plaster and salt. On this point Dr. Caldwell says;—"Some substances added to the soil check very much the rate of exhustion of the water by vegetation; salt acts thus, and plaster appears to be particularly effectual. Thus, the opinion common among farmers may be accounted for, that plaster lessens the danger of bad effects from a scarcity of water; they say it absorbs water, but this is out of the question; all the ground plaster that is sold has been exposed to the air for a long time before the farmer buys it, and it has ample time and opportunity to absorb all the moisture it can from that source. But if it serves to lower the rate, the evaporation of the soil-water into the air through the vegetation growing on the soil, it is plain that it may to some extent serve the same purpose as if it did actually absorb water from the air to be handed over to the plant crop according to their needs; it husbands the scanty stock of water in the soil, and forces the plants to be more economical in the use thereof. Some experiments with salt have shown that the soil of a grass plot to which this substance had been applied contained, ten days after rain had fallen, twice as much water as did an adjoining plot which had received no salt; and the plants on the former plot were growing vigorously after those on the other plot had begun to show signs of suffering for want of water."

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One of our American Exchanges very truly remarks on the above, that "one by one the old 'notions' of our elders get exploded by the scientific investigators, of whom there are so many now at work in the interest of intelligent agricultural practice. We are taught now to stir the soil only at the surface in times of drought, to make a mulching of the top inch or so, that will tend to prevent evaporation from the damper soil below. We are very confident that we have injured crops upon our own land by deep and frequent cultivation in hot, dry weather." The lesson, however, is worth bearing in mind, especially in this country, where drought is of such frequent occurrence.

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In reply to the enquiry of her Majesty's Government, addressed to the several Chambers of Commerce, as to the best possible way of utilizing the services of Her Majesty's Consular and Diplomatic officers in the promotion and extension of British trade abroad, the Chairman of the Madras Chamber of Commerce has replied as follows :—"The acknowledgments of this Chamber, in common with those of kindred bodies in the United Kingdom, British dependencies and colonies, are due to Her Majesty's Government for the anxiety that is being exhibited to utilise as far as possible the services of her Majesty's diplomatic and Consular officers in the promotion [and ex]tension of British trade abroad; and in acknowledging [receipt o]f the Proceedings of the Madras Government, 2nd ultimo,

No. 741, Financial, I am to say that, in the opinion of this Chamber, the solicitude that is being shown in this matter by the Foreign Office is well calculated to stimulate the energies and quicken the observation of those officers. There can be little doubt that, as a general rule, British traders are capable of safe-guarding their interests without the active assistance of consular officers, and that if those gentleman are accessible when information is sought, and if they strive to remove inequitable restrictions on British trade and shipping within the sphere of their official influence, but little more can be reasonably required of them. At the same time, they are often in a position to collect, compile and forward information connected with trade of very great value and to exert a beneficial influence without offering an interference that would be objectionable. If they educate themselves to take an intelligent interest, both in the course of trade in the countries or ports, to which they are accredited and in the capabilities of British trade, and if they are careful to submit the results of their observations or enquiries without delay to the Foreign Office, for immediate communication to persons engaged in commerce, they may greatly increase their usefulness to their country. The example set in this respect by American and German Consuls is one that is worthy of emulation by the epresentatives abroad of an Empire whose key-stone is trade."

THE Coconada Chamber of Commerce is not quite so sanguine about the results of the Government's proposal for the utilization of our Diplomatic and Consular officers abroad, so far as Cocanada is concerned, as the following reply will show :—"G. O., No. 741, Financial, dated 2nd August 1886, was put before the meeting, and it was resolved that, whilst it was impossible that efforts to promote trade could be viewed otherwise than with satisfaction, the Chamber must nevertheless abstain from putting forward any recommendations for the guidance of her Majesty's diplomatic and Consular officers, as the direction of the trade of this port is such that their services can seldom, if ever, be called into requisition in its regard."

THE following is a Summary of Messrs. Gow, Wilson and Stanton's Indian, Ceylon, and Java tea report, dated London, December 3rd, 1886 :—Since our last (dated 19th ult.) 41,340 packages Indian, 3,958 Ceylon, and 1,705 of Java tea, or a total of 50,003 packages have been offered in public auction. During the first week of the fortnight under review the sales were much interfered with by the presence of thick fogs, and prices ruled very irregular with a further contraction in values. This week, however, supplies have been on a more moderate scale ; doubtless the effect of small shipments from Calcutta, during the *Doorga Poojah* holidays, and prices have ruled steady. In analyzing the figures, we notice that notwithstanding an increase of more than a million and a half in the deliveries of Indian and Ceylon teas during November over those of the corresponding period of last year, the deliveries of China descriptions have remained stationary. Again, for the six months ending November 30th the consumption of Indian and Ceylon teas shows an increase of eight millions, against an increase of only four millions in China descriptions. The deliveries of Indian tea in November, exceeded those of October, by more than 500,000 pounds, whilst those of China tea decreased almost 3,000,000 pounds in the same time. The amount of Indian and Ceylon teas offered in public sales during the past six months exceeds by nearly 100.000 packages the quantity offered during the corresponding period last year.

As an idea of the current prices of Indian tea in London we quote :—

Fannings	... 6¼d.	same time last year	8¾d.	and 7¼d.	in 1884
Broken Tea	... 6¾d.	,, ,,	9½d.	,, 8¼d.	,,
Pekoe Soug :	... 8¼d.	,, ,,	10¾d.	,, 9¾d.	,,
Pekoe	... 9¼d.	,, ,,	1/-	,, 1/-	,,
Pekoe Soug :	... 6½d.				
Pekoe	... 7¼d,				

ˈly a limited quantity of Ceylon tea has been printed for sale. the selection has been an excellent one as regards quality, some invoices being quite equal in this respect to the best of last season. Among these should be mentioned shipments from Blackstone, Ellebedde, Laxapana and Wewelmedde. The figures continue to shew the satisfactory progress of deliveries, which still continue in excess of imports, with a consequent reduction of stocks. The demand for useless descriptions continues brisk, and buying is general, the teas going into consumption as soon as they are secured by the trade. Only one sale of Java tea of direct import has been held since our last report, and comprised 1,299 packages representing selections from seven estates. Amongst them were some specially noticeable parcels from "Sinagar," with excellent liquor, similar to Indian teas. The flowery pekoe in this invoice realized 2·1 per lb. Prices for both medium and good pekoes are firm, other sorts remain without material change, although good liquoring descriptions attract most attention.

THE depressed state of the agricultural industry in Germany is almost as bad as it is in Great Britain. *Kuhlow's Review* says :—It would be a welcome duty to report the revival of the agricultural industry but unfortunately it is yet impossible to do this. Prices are still very low and in comparison with last year they show a decided fall in some articles. Thus the quotations for wheat and rye were recently 151·75 and 128·50 Mks., respectively while the quotations just a year before were 160·9 and 140·5 Mks., a fall of 8·34 Mks, in one case and of 11·55 Mks, in the other, The import of corn has during the present year greatly decreased—in fact to the extent of 1,414,000 tons—as compared with 1885, a result of the higher duties, and yet prices have fallen and the agricultural interest complain of worse depression than ever. Such a result of the new tariff was never expected. It was expected that higher duties would at least improve prices by keeping out foreign competition ; yet while the later expectation has been realised the former has not. Of course, it may be said that the great imports which preceded the introduction of the new duties would tend to keep prices down for some time. There is some ground for this contention, yet even making all due allowance for it, it cannot be denied that the results expected by the protectionists and the farmers whom they professed to befriend have not been realised. While howewer farmers have lost on their corn they have secured a certain degree of compensation by the wool trade. Here a gratifying increase of prices may be chronicled. While last year at this time the price of 100 kg. of wool was quoted at Berlin at 265 Mks., the quotation is to-day 320 Mks. an increase of no less than 55 Mks. And still farmers are appealing for a wool duty. The sooner they recognise the impossibility of this demand the better.

IF any further testimony were required of the great superiority of ensilage as a food for stock, we have it in that furnished by Dr. J. A. Voelcker in his report on the important feeding experiments carried out at the instance of the Royal Agricultural Society of England on the Duke of Bedford's farm at Woburn, and which are described in Vol : XXII, Part II of the Society's *journal*. The question to be determined was : " Will bullocks fatten as well on silage as on a mixture of roots and hay chaff ?" There were three sets of experiments ; in the first two, roots and hay gave slightly better result than silage. But in the third experiment, lasting 82 days, a silage made of green oats, and preserved for eighteen months in the silo, was tried against roots and straw chaff, in conjunction with a similar allowance of cake and meal, and gave these results :—The cattle on the oat silage gained on an average nearly 2 lbs. of weight per head per day ; those on roots and straw chaff 1½ lb. per head per day. In another experiment, lasting 28 days, bullocks on oat silage gained 2 3/7 lbs. per head daily ; others on roots and straw chaff 1 3/7 lbs. A point of much importance brought out in these experiments was that *" upon the quality of the silage the matter of ultimate gain or loss depends."* [The italics are ours]. The cases in which the silage-fed bullocks showed results inferior to those fed on hay and roots, are thus explained , for Dr. Voelcker, in summing up the results of the first years experiments, when the inferior results aforesaid were obtained, says :—" It is to be remembered

that this was the first year's experiment in the making of silage at Woburn, and that the grass which was used was not in a condition, nor of a quality likely to produce really good silage. I am therefore not prepared to take the experiments of a single year as decisive." He further adds that "inferior grass will never make a food at all able to compare in feeding value with roots and hay, containing as nearly as possible the same amount of essential feeding-constituents." This was strikingly illustrated in a subsequent experiment, when superior grass was used. Oat silage gave the best results, and it was with this that the record of roots and hay was beaten by nearly 75 per cent. The *quality* of the grass used for ensilage purposes, and the quality of the *silage* produced, thus exercise a greater influence on the results in feeding than appears to be generally understood—at any rate by many of our Indian officials who conduct ensilage experiments.

* * *

We have already refered to the so-called Japan clover (*Lespedeza striata*) a forage plant spreading rapidly in the southern States of America which, says the *Planters' Gazette*, (London) it appears to do without being sown, the seeds presumably being carried by birds. Our contemporary furnishes some further particulars regarding this plant: "It is not a true clover and the name it bears was given to it because it was supposed to have been started in Charleston by the sowing of some seeds found in a cargo of Japan tea. Lindley, however, in his 'Treasury of Botany' refers to the plant as indegenous to North America. The *Rural New Yorker* states that it "came from the eastern part of the eastern Continent," and that it was first found near Charleston about forty years ago, by a Mr. Ravenel, who gave it the the name of Japan clover. It was not until about twenty years ago, however, that it began to attract attention, and the extravagant accounts of its virtues were given in the papers. The plant is an annual, but comes up year after year, self-sown, and grows so vigorously that it smothers most other grasses with which it comes into contact. Mr. Ravenel is of opinion that it will never be of any value as a crop to be cultivated like clover, and the *Rural New Yorker* states that, although on rich, damp soil, it will grow as high as eighteen inches, the leaves are small, and the stems too hard and woody to make good hay. On the other hand, a Virginia farmer gives his experience as entirely favourable to the plant. Ten years ago he procured some seed and sowed it on an acre in the middle of a sixty-acre field, being informed that it would spread all over the field and afford excellent grazing. This turned out to be true, Japan clover and Bermuda grass being the only grasses to keep green through the drought of 1885. Japan clover, he adds, starts early, and by July or August, when other grasses are failing, it forms a heavy dense sod, and affords excellent grazing till killed by sharp frost, starting again in the following spring, and spreading year by year. It will grow and form a sod on the thinnest land, and even in roads and other bare places where nothing else will grow. In Louisiana it is extensively used for hay. So far as we are able to learn, Japan clover has never been grown in England, and consequently it is not known whether it would flourish here, or whether it is worth having if it would. But possibly it might be valuable for poor pastures and waste grazing lands, and it seems especially adapted for some parts of Australia and New Zealand, as it has the rare merit of flourishing under the shade of trees.

FORESTRY IN BENGAL.

The earliest existing records show that every country in Europe,—including Iceland in which there is now not a tree—was at one time thickly covered with forest, and that these forests exerted so powerful an influence upon the climate, that the temperature was in the coldest months from 9° to 11° lower than at present. Germany had winters at that time, like those of West Russia now. Tacitus tells us that the sky of Albion was always overcast with clouds, though according to Cæsar, the cold was not so intense as in France. Coincident with the destruction of forests in Europe, there has also been a decrease in the volume of water in its rivers, particularly in Russia. The same phenomenon has been observed in recently discovered originally built 1¼ miles from the lake of Valentia, was found by Humboldt to be 3½ miles off. That the destruction of forests should affect the water-supply, is not to be wondered at. Forests may or may not increase the rainfall, although there can be little doubt that on the summits and slopes of mountains they do; but they economise the fall by preventing too rapid evaporation and short-lived floods.

In addition to modifying the climate and diminishing the water-supply, the destruction of its forests brings upon a country the calamities of want of fuel and of timber. Forests are therefore a necessity, except in soils in which the water is stagnant, and then conservation becomes of the utmost importance. And yet this fact was first clearly recognised by the Government of India, but 22 years ago. The foundation of our forest administration was laid in 1864, when an Inspector-General was appointed for all India, Dr. John Anderson, the Superintendent of the Calcutta Botanic Gardens, being appointed the Conservator for Bengal. His attention was early directed to British Sikkim, which then had 105,000 acres of forest land, and to Assam. In 1865 a special Act was passed to give effect to the rules framed by the Inspector-General for the conservancy of forests, and their control was gradually taken out of the hands of the district officers, and vested in men who had received a special training in forestry. Several practical foresters from Scotland were brought out to India, and two from Germany, who had served in the State forests of Hanover and the Grand Duchy of Hesse-Darmstadt. In February 1858, seven young men were selected in England, and sent to the forest schools of the Continent; and in the following year, the department was thrown open to natives of India.

The Forest receipts and expenditure of each province 1865-66 were:—

	Receipts Rs.	Charges Rs.
Bombay (including Sind)	10,07,610	7,75,054
Burmah	5,98,629	3,12,066
N. W. Provinces	6,50,401	2,92,514
Madras .. .	3,26 201	2 53,582
Punjab ...	2,08 050	2,72,078
Central Provinces ..	2,02,644	1,13,498
Oudh	1,19,969	58,769
Coorg	1,08,257	12 649
Bengal	38,584	35 772
Hyderabad	15,706	8,991
Straits Settlement... ...	3,034	242

In 1866-67 the employment of a larger number of trained officers raised the expenditure in Bengal to Rs. 1,04.207, while the income amounted but to Rs. 50,555. The financial results have steadily improved ever since, and from last year's Progress Report, we find that there was a surplus of Rs. 2,27,033, the receipts having increased tenfold, while the charges have but trebled. The result must be regarded as very creditable to the department, and particularly to Mr. Home, who was in charge during the year, and to his assistants. "I understand the expenditure," we hear some reader say, "but what is the source of the income?" During 1885-86 no less than 25,392,632 c. ft. of timber and fuel were obtained from the forests of these Provinces, the greater part of which was felled, and carried, by permit holders, departmental working being little resorted to in Bengal. The quantity obtained in 1884-85 was 22,003,889 c. ft, the increase being accounted for, by a revival of the demand for both timber and fuel, in the Sunderbuns. In the previous year, it was reported that the firewood merchants, having large stocks on hand in Calcutta, were holding out against prepayment for produce removed from the forests. Their course caused a considerable falling off in the quantity removed from the Sunderbuns in 1884-85. As their stocks ran out however, and they saw that it was hopeless to expect any alteration in the rules, the merchants gave up their opposition and in 1885-86 the removal of forest produce from the Sunderbuns was resumed on the same scale as in 1883-84. There was also a slight increase in the Teesta sub-division, due to larger demands for fuel on the tea estates. On the other hand, there was a falling off in the Darjeeling sub-division, owing to the growing scarcity of trees fit for timber; as also in the Buxa division, presumed to be due to merchants sending

able at almost nominal rates. The number of bamboos removed was 24,389,863, against 21,710,126 in the previous year. Another source of forest revenue, though a small one, is the grazing fees and the sale of fodder. It is satisfactory to learn that graziers observe the rules willingly, and have ceased to agitate for further privileges.

The forest has many enemies. Chief among these, are the unlicensed wood cutter, fires, and creepers. No less than 642 prosecutions were instituted during the year, for breaches of orest law. An area of 829,253 acres was placed under protection from fire, being an increase of 23,444 acres, over the area brought under protection in the previous year. The additional areas taken in hand are in the Angul and Singbhom forests, where great difficulties have to be encountered, arising in Angul from the impossibility of properly clearing the boundary, at the numerous points where its exact position is a matter of dispute, with the adjoining native States: and in Singbhooom from the wild character of the aboriginal races inhabiting the orest, who have been accustomed from time immemorial to fire the jungle at certain seasons. Special attention we are told was given to the cutting of creepers in Kurseong, and in Buxa during the year.

It is affirmed that forests may be made even more productive than cultivated land, but the forest officer knows that this can be achieved only by steady adherence to settled plans of administration. Improvements, however desirable in themselves, require to be made very cautiously, and Mr. Home claims credit for no very startling innovation. Experiments with mahogany seed were continued during the year, but the seed would not germinate either at Darjeeling or Kurseong, while in the Terai only a moderate degree of success was attained. In Chittagong, devi-devi and paper mulberry seedlings, were successfully planted out, but India-rubber again proved a failure. We have for many years looked forward to the development of our reserved Indian forests, as one of the main sources of our future revenue, and the steady progress that is being made in this direction, confirms the correctness of our hope.

DATE-PALMS FROM ALGIERS AND TUNIS,

THE following letter has been addressed by Dr. E. Bonavia to the Collector of Etawah regarding the importation of date seeds and offsets from Algiers and Tunis:—

I have the honour to acknowledge with thanks the receipt of docket dated 14th October 1886, from the Commissioner of Agra to the Collector of Etawah for perusal, regarding date seeds and offsets from Algiers and Tunis, with enclosures, which I beg herewith to return as requested. I would, however, beg permission to make a few remarks, as it appears to me the vice-consul at Susa has unnecessarily exaggerated the difficulty of transmitting offsets of the best date palms from that place to India.

The object of importing offsets at all is because the fruit of the latter will be *identical* with that of the parent plant, and this is the only way of propagating any particular desired variety. This, however, may perhaps not be of great importance. I have just despatched a number of bottles to the Kew Economic Museum, containing dates in sprits, all from trees in Oudh, raised solely from *seeds* obtained from the Persian Gulf. They are all very fine dates. This shows that date trees raised from *seed* give very fine fruit. I cannot, however, say whether they have in any way varied from the fruit of their original parents. The trees in Lucknow, which were raised from offsets, were imported from Bushire in the Persian Gulf in 1872-73. They arrived in perfect condition, and were packed loosely either in closed boxes, or sewn up in sacks without any earth whatever. Last year in Bangalore, Mr. Cameron imported a number of date offsets also from the Persian Gulf, and they also arrived in good condition. Both these came to India *via* Bombay. Quite recently the superintendent of the Saharanpore botanical garden imported a number of offsets also from the Persian Gulf, but these I believe came *via* Karachi. I am informed that they reached Saharanpur in splendid condition. Some of them were kept there, some were sent to Lucknow and others to Jeypore, Ajmere and Oodeypore; none of these offsets had a particle of earth.

The steamers from the Persian Gulf are those of the British India Steam Navigation Company. These being cargo boats, go slowly, probably at half speed, as I have experienced, in order to economise fuel, moreover they stop at the different ports to deliver and receive cargo. Therefore these Persian Gulf steamers would probably take as long from Bushire to Bombay as the Peninsular and Oriental steamers, a mail boat, would take from Malta to Bombay. Therefore, in my opinion, date tree offsets can be as quickly and as safely transmitted from Tunis to India as from Busrah, at the head of the Persian Gulf. At page 36 of my little book on the "Future of the Date-Palm in India," the Assistant Resident, Persian Gulf, distinctly states that "these offsets are extremely hardy, and may remain for 8 or 10 weeks exposed without injury." In that period they might now-a-days be easily transported from New York to Melbourne, sewn up in sacks, and with ordinary care be made to *strike* under the shade of trees. There appears, however, one thing necessary for success The offsets should weigh at least about 6lbs. when separated from the parent tree. At page 44 of the same book, it is stated that—"It is the size and vigor of the offset, and not its *age* which decides its fitness for being detached and transplanted. Under favourable circumstances, however, an offset three or four years old is large and vigorous, and does not usually suffer by being detached from its parent and separately planted. The average weight of an offset suitable for removal should be about 6lbs. Heavier weights are, however, preferable, as after planting, such offsets grow vigorously and rapidly." It is quite evident, therefore, that there is no necessity whatever for the shoots to weigh 10lbs as the Vice-Consul at Susa says; nor is there any need for them to be sent surrounded by earth or to be sent in Wardian cases. All that is required is, that the offset stripped of its outer foliage and leaving only the central shoot, should be of a certain weight, age, and vigour, as before stated. The packing need be no other than a simple closed box or a sack.

In my opinion, it would certainly be unsafe in India to plant offsets on the Tunisian system, *viz.*, that of putting layers of *straw* at the bottom and half way up in the *holes* in which the offsets are planted. Probably in Tunis they have no white-ants; and this system, although I see no necessity for it, may not be unsafe there; but in India the straw would assuredly be attacked by white ants, which afterwards might eat the date stumps also. Even without the attraction of straw, Mr. Cameron at Bangalore found that his offsets were being attacked by white ants, and he thought it safer to lift them up, and replant them in large pots in the shade where, when I last heard of them, they were doing well. All that is wanted, in my opinion, is good soil, shade, and ample watering, until they strike, and the best time for their reaching India is either September or October.

Offsets from the saline oases of south Algeria, I admit, would be difficult to procure, as they would have a long land journey on camels to the coast. But of *seeds* of the Algerian date palm, there need be no difficulty in procuring, as date seeds live long—at least a year, and for all we know perhaps many years. This I know that date seeds in winter lie under the soil for 2 or 3 months before germinating, while in the hot weather they germinate in 2 or 3 weeks. The object of obtaining date seeds from the saline soils of south Algeria is, I think of some importance. They might be better suited to experiments in the saline soils of Rajputana, where such soils appear to be very frequent. I found no advantage in sowing date seeds with the pulp on: on the contrary, the sweet date pulp may attract white ants and other insects. In a state of nature the seed would never be sown with the pulp on, as either birds animals or insects would have eaten the sweet pulp long before the seed could have had any chance of germinating. Nevertheless, there may perhaps be some small advantage in importing seed in the pulp, as the sower would then be certain that the seed is of a fine kind; moreover, natives might see what fine dates are like. The bulk would in that case, however, be increased. There is no disadvantage that I can see, but rather the contrary, in the seeds being mixed, provided they be of the best kinds Varieties that ripen *very early* or *very late* would, I think, be especially desirable for experiments in tracts subject to the south-west monsoon of India.

COTTON CROP OF BOMBAY PRESIDENCY, 1886-87.

THE following official report has been received for December on the prospects of the cotton crop in districts of the Deccan where cotton is sown in June and July:—

Khandesh.—Revised area about 977,000 acres, or 26 per cent. above average and 41 per cent above last year. Of the total area, about two-thirds under indigenous, that is, Varadi and Khandeshi cotton, and the remaining one-third under the long stapled exotic, that is Hinganghati and Dharwar-American cotton. The largest area under the exotic variety is in the south-east part of the district through which the railway line passes, and the area under it.

In the Jamner, Bhusawal, Pachora and Chalisgaon talukas comprises nearly two-thirds of the exotic cotton in the whole district. The talukas with the largest area under indigenous cotton are Erandol, Sindkheda, Dhulia and Sanda. The rainfall in June was well-distributed and especially favourable to cotton sowing; and to this is due the large increase in the area under this crop. The abnormally heavy rain, which fell towards the close of June and occasionally in July, was injurious, specially in Dhulia, Pimpalner, Sindkheda and Sanda, rotting the crop in some places where it had to be removed and *bajri* substituted for it. But the break towards the close of July saved the bulk of the cotton and was generally beneficial throughout the district. The August rainfall was particularly favourable in Bhusawal and Nandurbar. The long break in September from the 5th to the 29th was injurious to cotton especially in light soils. The rain that fell towards the close of September and early in October was everywhere opportune and revived the crops. The untimely heavy *Swati* rain (22nd October to 3rd November) caused more or less injury in Jamner, Chalisgaon, Raver and Jalgaon. Though the season is not as much above the average as was expected, it is still on the whole a good one and considerably better than that of last year. The average annas yield as far as it is reported, falls below 12 annas, in Chalisgaon (10 annas), Raver (9) and Jamner (9) only. In the other talukas (except in Erandol and Shirpur for which no details have been received), the yield is above 12 annas. The first picking has been completed in some parts and the second is in progress. Except in Sindkheda there is as yet very little export trade.

Ahmednagar.—Revised area about 56,000 acres; that is, about 2·33 per cent above last year and about 51 per cent above the average. The chief cotton growing talukas are Shevgaon, Nevasa, Jamkhed and Nagar. The area in Karjat, Shrigonda and Kopargaon is very small, whilst the western talukas of Parner, Akola and Sangamner grow none. Except about 80 acres in Nevasa, the whole area is under indigenous cotton. As in Khandesh the increase over last year is due to favourable early rains. This increase is general, but is most marked in Nevasa Shevgaon and Nagar. The prospect was at first good, but in parts of Shevgaon, the heavy rain that fell in the beginning of September broke the leaves of the plants. The *Swati* rain has also done much mischief all over the district. The anna yield is reported to be 6 annas in Nevasa and 5 annas in Shevgaon and Jamkhed. Cotton-picking is in progress in Nevasa and Jamkhed. The outturn will be larger than last year.

Nasik.—Area about 20,000 acres that is about 35 per cent less than the average, but nearly 8 times above that of last year. The chief cotton-growing talukas are Malegaon, Nandgaon and Baglan. In Kalvan and Chandor there is a small area under cotton; but in the rest of the district it is not grown. Of the total area, about one-fourth is under exotic cotton and that only in Nandgaon. In June the early rain being light, the sowings were retarded and the month's fall was neither so seasonable nor so well distributed as in Khandesh. The July rain was however more favourable in both respects. On the whole the rainfall was more timely than last year and to this is due the increase in area. There was a heavy fall of rain early in September in Nandgaon and Malegaon while the August rain was insufficient. There followed a long break, relieved by light showers early in October, but these were insufficient. As in Ahmednagar, the *Swati* rain was injurious, but no serious damage resulted, as the anna-yield is reported to be 10 annas in Malegaon and Nandgaon. The outturn will be larger than last year. In Nandgaon there are already small exports in new cotton, which is being sent to Malegaon and Bombay.

Sholapur.—Revised area about 29,000 acres or more than four times that of last year and 13 per cent above the average. The area under exotic cotton is reported to be 254 acres of which almost the whole is in Karmala. Cotton is grown all over the district. The increase due to favourable rains is very great in Malshiras, Pandharpur, Madha and Barsi. The rains began earlier than elsewhere in the Deccan and were seasonable for cotton sowing, especially in Pandharpur, where last year cotton was not sown at all, owing to want of favourable rain. The September rainfall was excellent and the prospect were up to that time very encouraging. But the *Swati* rain and the rain that fell about the middle of November injured the crop a good deal in most parts of the district, especially in Karmala, Barsi and Pandharpur. The yield is reported to be 8 annas in Sangola and Madha, 6 annas in Sholapur, 4 annas in Malshiras and Barsi and 2 annas in Karmala. As yet there is but little trade in new cotton.

Poona.—Indapur is the only taluka where cotton is grown Area 10,672 acres against 230 in the last year. The large increase is due to favourable rainfall in June and July. Here also the *Svati* rain was injurious and caused blight. The yield is estimated at 8 annas.

Satara.—Area about 13,000 acres, that is, nearly up to the average, but slightly below the area of last year. The chief cotton talukas are Tasgaon and Valva. There is also a small area under cotton in Khanapur, Karad and Khatav; but in other parts of the district cotton is not grown. In Tasgaon the crop is reported to be good, and in Valva fair; in Khanapur injury from *Svati* rain is apprehended. In Karad damage by boll worm has been reported, brought on by heavy dews.

STATES.

Akalkot.—Area 1,458 acres; slightly less than last year. Here also the *Svati* rain was harmful. Yield estimated at 4 annas.

Satara Jagirs.—Cotton grown only in Aundh (4,462), Jath (5,755) and Daphlapur (1,021) or 11,218 acres in all. Last year the area in these States was only 4,000 acres. Crop middling, yield estimated at 8 annas.

COTTON FORECAST, DECEMBER.

Early Districts of the Deccan.

District.	Area, 1886-87	Area, 1885-86	Average area for last 7 years.	Increase or decrease (in 1886-87) per cent over or below 1885 86	Average.
DECCAN.					
A. British Districts.					
Khandesh ..	977,195	678,348	773,586	+44 05	+26 32
Ahmednagar ..	56 037	16 785	36,905	+233·85	+51 84
Nasik ...	19,930	2 409	30,884	+727 31	—35 46
Sholapur ...	29,306	6 797	25,829	+331·16	+13·46
Poona ..	10,673	230	6,030	+4540·43	+77 00
Satara ...	12,921	16,585	12 322	—22·09	+4·86
Total A ..	1,106,062	721,154	885,556	+53 37	+24 90
B. Native States.			Not recorded.		
Akalkot ...	1,458	1,486		—1 89	
Satara Jagirs ...	11 218	4 053		+176 7[illegible]	...
Total B. ..	12,670	5,539		+128 87	

Miscellaneous Items

THE export of wheat from the Central Provinces from the 1st of October to the 11th of December was 546,631 bags of two-and a-half maunds each as compared with 492,073 bags in the corresponding period of last year.

THE sugar growers and manufacturers in Java will be interested to learn that a Bill has been introduced into the Netherlands House of Assembly for the abolition of the export duty on sugar, and of the tax of 25fl. payable by private sugar manufacturers in Java.

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 7th of December was 131,138,035lbs., as compared with 137,505,105lbs., exported during the corresponding period of last year. The exports to the United States and Canada during the same period were 74,673,897lbs. as against 65,501 333lbs.

Phytolacca electrica, is the name given to a plant which possesses strongly marked electro-magnetic properties. In breaking a twig the hand receives a shock that resembles the sensation produced by an inducting coil. Experiments made on this plant (says the *New York Medical Times*) showed that a small compass was affected by it at a distance of about twenty feet. On a near approach the needle vibrated, and finally began to revolve quite rapidly. The phenomenon was repeated in a reverse order on receding from the plant. It is said that no birds or insects are ever seen about this plant. The soil where it grew contained no magnetic metal like iron, cobalt or nickel, and it is evident the plant itself possesses this electrical property.

THE net value of gold imported to this country from the beginning of the official year to the end of October was Rs. 80,24,346, and that of silver imported was Rs. 3,89,26,063, making the total net imports of the precious metals Rs. 4,69,50,409. The assay value of coins and bullion received in the Indian Mints during the same period was Rs. 2,49,97,840, and of the same coined and examined Rs. 1,78,57,604.

AMONG other places in the world where petroleum may be expected to be found, some of the Dutch possessions in the West Indies may be mentioned. We are told that, "guided by careful observations, the Dutch Government have reasonable ground for supposing that Java, Sumatra, and other islands of the Archipelago possess large deposits of petroleum, which could be profitably worked." An engineer in the Dutch-Indian Civil Service, Mr. A. Stoop, has accordingly been instructed to visit the head-quarters of the American petroleum industry in the United States and Canada, in order to gain information concerning the working of petroleum springs.

A CORRESPONDENT of the *Gardeners' Chronicle* lately made a botanical tour in Costa Rica, whence the bulk of the so-called Jamaica Sarsaparilla comes. Among other things he mentions finding an anonaceous plant, probably a Hylepia, exhaling a perfume very like that of *Cananga odorata* (Ylang-ylang), and a tree known as the "samba gum tree," which yields on incision a creamy-looking yellowish sap, which after a time becomes hard and resinous and then resembles the tenacious hog gum of Jamaica, the produce of *Symphonia globulifera*. He also met with a thin-coated cocoanut one-third larger than the ordinary kind, and which he thinks deserving of cultivation. The natives ornament their cheeks with paint made among other things from an oleoresin resembling elemi, yielded by a tree called "pontapè." This paint is prepared by burning the oleoresin and collecting the lampblack, a purpose for which it is doubtless well adapted.

REFERRING to the manna crop of Sicily the *Chemist and Druggist* says :—"We are in possession of the following from Sicily with reference to the reported failure of the crop :—At the commencement of the season the prospect was an excellent one, and the incisions in the trunks of the manna trees were exceptionally rich in yield ; but the gathering was repeatedly interrupted by rain-storms and on the whole the yield has therefore been an unfavourable one. But it is questionable whether there is any real foundation for the alarming reports which have been promulgated by local speculators, and it is thought in many quarters that a reaction will take place if only consumers keep back their orders for some time. It certainly appears strange that until now there has not been any reliable statement published concerning the quantitative result of the crop. The varieties known as "cannellata capace" and broken cannellata are gradually losing favour and the price for those does not appear to have been affected by the boom."

THERE is project on foot in France to have nickel coinage. On this subject the Paris correspondent of a contemporary says :—"The Bill presented by M. Alfred Letellier, now before Parliament, provides that the new coins shall be made with an alloy, composed of 25 per cent. of nickel and 75 per cent of copper. They are to replace the bronze pennies now in circulation, which—thirty years ago was considered an improvement—are now thought too cumbersome for our effeminate period. The weights would be 4 5, 3·5 and 2·5 grammes, and the diameters 24, 22, and 20 millimetres for the 20, 10, and 5 centime pieces respectively. In other words, the two penny coin would weigh (in round figures) 70 grains, and have a diameter of 1 inch ; the penny, 55 grains and nine-tenths of an inch ; and the half-penny, 39 grains and eight-tenths of an inch. The alloy, well-known and appreciated in America and Belgium, is almost silver-white and remains clean when circulated. Various models of the new coin were presented to the Chamber of Deputies.

AN Exchange informs us that cobalt ore has recently been found near Kilkivan, in the Wide Bay District of Queensland. The ores of this metal were hitherto unknown in the colony, although the neighbourhood of Kilkivan was known to be rich in mineral products, including gold, silver, copper, mercury, and lead. Mr. F. Smith, who discovered the deposits under notice, reports that they come under the designation of earthy cobalt, and were mixtures of cobalt, nickel, iron, manganese, and copper in somewhat variable proportion. ... miles distant from Kilkivan itself; the reef or lode of the ore now being opened is situated in one of the spurs near the heads of the Wide Bay Creek, and between the tributaries of that watercourse known as Fat Hen and Copper Mine Creek. The reef measures 21 feet in thickness, but it is not claimed that the whole of this is cobalt ore of the best quality. It is said that the Queensland ore contains no less than 22 per cent of cobalt, which, if true, would render it more valuable than any other cobalt now in the market, as the average yield of the commercial cobalt does not exceed from 2 to 10 per cent. Cobalt is a mineral of which the price, to a great extent, depends on its supply, and the latter has hitherto been small ; but no doubt with a greater output fresh uses for cobalt will be discovered and the mineral become more valuable. The existing statistics of the production of cobalt in many cases give the ore as of nickel and cobalt. In the United States, in 1882, the value was 3,000*l.*, but the quantity raised was not stated. In Germany, in 1881, statistics gave 191 tons, value 13,005*l.*, equal to 68*l*, per ton; in Spain, in 1882 40 tons, value 1,046*l*, equal to 36*l*. per ton; in Norway, in 1879, 108 tons, value 11,112*l.*, or 103*l.*, per ton, and finally Sweden produced an average quantity of 153 tons per annum during ten years. The value of the ore of nickel and cobalt was given variously as from 40*l*, down to 4*l.*, according to quality and locality. Kilkivan is situated in the Wide Bay district of Queensland, to the north-west of Brisbane, at about 26° S. Lat, and 153° W. Long. The Kilkivan branch of the Maryborough and Gympie Railway which is about to be completed, will open up the district to commerce.

Selections.

CULTIVATION OF TOBACCO IN THE NORTH-WEST OF EUROPE.

II.

TOBACCO may be grown on almost any soil, but the results are never satisfactory on a stiff clay or a poor sand. Going to the extreme of suitablity, it is generally considered that a rich loam or marl is the most favourable for this, as for most other cultivated plants. A large quantity of decayed vegetable matter in a soil renders it specially suitable for the cultivation of tobacco, which delights in the presence of slowly decomposing manurial substances. This vegetable matter furnishes the necessary organic acids to unite with the potash applied as a manure, and thus gives the product the quality necessary for the purpose of enabling it to be manufactured into cigars. In America, newly cleared and charred forest-lands are preferred for the production of the finest quality of tobacco ; but this condition can rarely be obtained in a densely populated and highly cultivated country like England. Next in importance to the quality of the soil are its situation and its hygrometric properties. Tobacco cannot flourish if exposed to high winds or to moisture at the roots. It is quite as sensitive to these influences as we are to draughts and wet feet. For these reasons the Dutch, who cultivate tobacco under most disadvantageous circumstances, plant out the seedlings on high ridges, and divide the land into small squares by live fences, as I shall describe hereafter. It may, indeed, be accepted as a general rule that tobacco cannot be successfully cultivated in the north-west of Europe unless, either by natural or artificial means, the old political cry be varied to "Shelter," "Shelter," "Shelter," and as such, put into practice. If the shelter be natural, so much the better ; but if natural shelter does not exist, it must be provided artificially.

It therefore appears that while tobacco leaves the grower a wide choice of soil, it is very exacting as to situation and climate. All conditions may, however, be modified more or less by artificial means; but with tobacco as with many other agricultural and industrial plants, there are certain unknown, or at least undefined, circumstances which so greatly influence the quality of the product, that they alone determined the suitability of its cultivation for profit. In illustration of this point, I may again quote the adjoining French Departments of the "Nord" and the "Pas de Calais." I was everywhere told that the tobacco grown in the former Department was only fit for snuff, while that grown in the latter was good enough for cigars ! Here one has the Alpha and Omega, and the only explanation I could find was that the soil in the "Pas de Clairs" is much lighter than that in the "Nord," except in one *arrondissement*, where the tobacco has the same quality as across the administrative boundary.

As to the rotation of crops, they vary very much with the nature of the soil and also with the climate. In Belgium and the heavy-land districts of the North of France, as well as in Germany, an interval of at least three years, between tobacco crops is considered necessary, and wheat never forms part of the rotation, because in consequence of the land being so highly charged with manure, the wheat plant becomes too proud, makes a large quantity of flax, and does not blossom well. The Belgium system is to grow barley, rye, and oats, or maize in the interval ; but clover is avoided on account of the danger of wire-worm. In the Palatinate, two succeeding crops of spelt, or one of spelt followed by beetroots, or potatoes are in the immediate precursors of the tobacco-plant. In the Netherlands, and in the light-land districts of the "Pas de Calais," tobacco is taken continuously on the same land—a practice which is said to improve the quality, but to diminish the weight of the crop.

The preparation of the land and of the seed-bed has been already described in the instructions issued by the French Society, but I may add that, while the system of protecting the seedlings with frames covered with oiled paper prevails in the Netherlands, it is generally regarded as sufficient protection in France and Belgium

if straw be placed over them at night. This again is a matter of climate.

The manuring of the land for tobacco is of the greatest importance, and many experiments have been made with a view to ascertain the effect of different manures and of different manurial constituents upon the bulk, the colour, the flavour, and especially the combustibility of the leaf. In Belgium, where quantity is chiefly aimed at, compost and oil cakes are placed in the front rank of manures, and are followed in order of merit by street-sweepings, fœcal matters, guano, fish-manure, pig and sheep-manure, and last of all, farmyard-manure. In some districts of France, the use of forcing manures is prohibited; however, the following examples may be deemed illustrative: One large grower (10 to 15 acres) in the Department of the "Nord," whom I visited this autumn, applies 20 tons of farmyard manure per acre in the winter months, and 4 tons of rape and other cakes in the following March. In this case, notwithstanding the heavy dressing of manure, the tobacco was only fit for snuff, because, I resume, the soil is too heavy to enable it to produce a finer article. Another illustration from the Northern Department of France may be given to show how the residue of beetroot distilleries is utilised on a large scale as a manure. On a farm not far from the one previously mentioned, the land is turned up in ridges about 12 inches high and 20 inches from crest to crest; as soon as the first frosts appear, the liquid refuse of the distillery is turned into the furrows; in the spring the ridges are split and the tobacco planted in the usual manner. If the supply of distillery refuse fails short, it is supplemented by oilcakes to the extent thought necessary. In this case the land was cultivated upon a three course shift of (1) Tobacco (2) Beetroots, (3) Wheat; and the crop of beetroots regulated the quantity of distillery refuse available. But almost wherever tobacco is grown from the Netherlands to the United States, great faith is placed in the value of sheep-dung. On this point I may quote an American opinion as expressed in the recently published 'Statistics of Agriculture' for 1880 (p. 244, of the chapter on "Tobacco Production in the United States"):—

"The cause for feeding so many sheep for their mutton in this valley (Connecticut) is the high value of sheep-manure for tobacco-growing, it having the effect on our light soil to produce a dark-coloured silky leaf, of good burning quality, suitable for wrapping fine cigars. This tobacco burns white, and has a good sweet flavour, perhaps owing to the potash it derives from the manure. So valuable do we consider this sheep-manure, that we have shipped, since 1870, from West Albany, from 50 to 60 cords,* costing from $8 to $10 a cord, every spring. On our light soils, called pine lands, after raising crops of tobacco, 2,000 lbs. to the acre, we have sown wheat, yielding 30 bushels, plump berry and heavy weight of straw, on land which, without this dressing of manure, is fit only for white beans. We of late years feed with our sweetest and finest hay, and mixed with our corn one-third cotton seed meal. By so feeding, our sheep fatten more easily, being more hardy and better conditioned, beside increasing the value of the manure and rendering it more rich of plant food."

Against this statement, however, I should mention that in some northern light-land districts, such as portions of the "Pas de Calais," the use of sheep-dung is believed to give too dark a colour to the tobacco leaf and thus seriously to depreciate its value. On this account the use of rape-cakes as manure is much preferred.

With regard to the prevailing opinions in New England on the influence of other manures on the tobacco-crop, the reporter for New England remarks as follows:—

"There is a considerable contrariety of views expressed respecting the effects produced upon the quality of the tobacco by the application of the several fertilizers. In some of the schedules returned to this office from intelligent growers, it is strongly stated that heavy manuring is not only necessary to grow heavy crops, but that in the heaviest crops is found the largest proportion of excellent leaf. Others claim that heavy fertilisation, while it adds unquestionably to the quantity produced, yet affects the quality injuriously as to texture, strength, and silkiness. These contradictory statements can only be reconciled by the hypothesis that the soils in either case are radically different in chemical constitution. Says one schedule: 'Fish-guano makes tobacco heavy, rough, and scaly, with bad burning qualities.' Others claim that fish scrap is an excellent manure. The first statement accords fully with that made by Professor Johnson as to the widespread prejudice existing among tobacco-growers to the use of fish or fish guano on tobacco fields. Of the beneficial effects of Peruvian guano on tobacco soils, there is no discordance of views.

"In the Housatonic Valley the land whether, sod or cultivated in a previous crop of tobacco is treated to a heavy application of stable manure, running as high as thirty or forty cart loads to the acre, at a cost of from $50 to $60, cow dung is said to have the best effect upon colourhorse-dung though making a good quality of tobacco, inducing lighter colours. Saltpetre also is applied to improve the quality. All fertilizers, except special manures are spread broadcast over the land and are ploughed or harrowed in; and without their use it would be considered folly to plant a crop of tobacco, as the small size of the leaf, and the deficiency in gum and other qualities would make the crop exceedingly unprofitable."

To discover the *rationale* of the manuring of land for tobacco, was one of the objects of numerous experiments made by M. Schloesing in the years 1861-65. M. Grandeau published an abstract of M. Schloesing's reports in 1868, and from that little work it appears that the chief conclusion arrived at under this head may be stated as follows †:—Tobacco often needs a very strong manuring, in order to acquire one of its essential qualities, *viz.*, combustibility; if it follows in the rotation either beetroots, peas, clover, or any crop which requires much potash, a sufficient quantity of that material will not be left in the soil to render it combustible. Therefore it is not nitrogen, as is generally believed, that is necessary in the manure, but potash. Finally M. Schloesing believes that he is authorised as the result of his experiments, to state simply that tobacco absorbs much more nitrogen from the air than has hitherto been allowed, and therefore does not require, for its successful cultivation, a heavy nitrogenous manuring of the soil. As a matter of ordinary farm-practice, I have myself found that potash is largely used to increase the "combustibility" of tobacco grown on land which will produce a leaf fit for smoking purposes, but not on land suited only for snuff-tobacco.

In the year 1878 80 further experiments as to the influence of potash upon the tobacco-plant were made by M Blot.‡ with a view to check the results at which M. Schloesing had arrived nearly 20 years previously. He came to the conclusion that there is a maximum quantity of potash united with organic acids in the tobacco plant towards the 75th day of its germination.§ and at the period when the superficial development of the lower leaves ceases. Also that their is an uninterrupted increase in the quantity of nicotine from the germination of the seedling to the maturity of the disbudded plants. Further, that atmospheric conditions have a manifest influence upon the proportions of potash and nicotine, humidity hastening the assimilation of potash and retarding the elaboration of nicotine while heat favours the latter operation.

A variety of considerations of much practical and theoretical interest are suggested by the experiments of these two eminent men, and have been fully discussed by them. In the present experimental condition of tobacco growing in England it is only necessary to mention the following:—

(1.) That the influence of potash is specially physical, not adding to the weight of the crop, nor having any appreciable effect upon the percentage of nicotine which it contains, but giving to the leaves fineness and suppleness.

(2.) That therefore the best cigars are made when the leaves are gathered before maturity, and when they contain the greatest quantity of potash.

The great question for the grower is, whether it would pay him better to harvest his tobacco early for the sake of extra quality, or to allow it to become more ripe for the sake of extra quantity. I have no data bearing upon this question, except the results of two experiments made by M Blot himself in France, where the prices are fixed a year in advance by a Government department, and where, therefore, competition finds no place.

M. Blot's first experiment was made in the Department of the Gironde in 1873, where the experimental plot of plants gathered before ripeness, gave a crop at the rate of 1,380 kilos per hectare, and a gross return of 1,010 fr., at the price of 73 fr. 18 c. per 100 kilos fixed by the Regie. A similar plot of tobacco, gathered when fully ripe, yielded at the rate of 1,640 kilos, and a money return of 1,160 fr., at the Regie price of 70 fr. 73 c. per 100 kilos. Therefore the production of the finer quality in this case entailed a loss upon the grower of 150 fr. per hectare, or 48*s.* per acre.

The second experiment was made in 1881, in the Department "du Nord," with the variety of tobacco known as "Pas du Calais." The produce of the immature plants was at the high rate of 2,700 kilos per hectare, and was worth 2,850 fr. at the State fixed price of 105 fr. 55 c. per 100 kilos. The ripened plants came to as much as 3,100 kilos per hectare, and at the then fixed price of 100 fr. per 100 kilos for such tobacco gave a gross return of 3,100 fr. per hectare. Here, then, the fine quality of tobacco yielded a small return to the grower, than the coarser and ripe crop to the extent of 250 fr. per hectare, or 4*l*, per acre.

As I have before indicated, I possess no means of ascertaining what the results might have been under a system of free cultivation, free sale, free purchase, and free manufacture. One remark may, however, be permitted, namely, that although the distinctive quality of tobacco exists in the secretion of its essential oil—nicotine, yet the efforts of the grower seem to be devoted to the diminution of its percentage in the leaves, and the increase of their combustibility; while the curer, as will be seen presently, devotes his attention to the production of a comparatively light colour.

As stated by the French Agricultural Society, the land must be first ploughed immediately after the preceding crop has been harvested, namely, as early in the autumn as possible, and a heavy dressing of cow manure is then turned under. According to the strength of the land, two or three ploughings and harrowings are given in the spring, the last act of cultivation being accompanied by a heavy dressing of sheep dung, rape, or other oil-cake, guano, or some artificial manure rich in potash. Generally speaking, the land is set up in ridges and furrows, and the seedlings are transplanted at various intervals according to the nature of the variety of tobacco cultivated and the quality of leaf desired. The ridges are from 16 to 24 inches apart, and the plants from 14 inches upwards distant in the rows. Some growers prefer to plant the seedlings in separate hills from $2\frac{1}{2}$ to 3 feet apart, and this plan has been adopted by Messrs. Carter on their experimental acre near Bromley, the land having been dressed in the autumn with 30 tons of farmyard manure and in the spring with 7 cwt. of a special artificial manure containing a large percentage of potash.

* A cord weighs about 2 tons

† 'Le Tabac sa culture' &c, par Th. Schloesing, precedo d'une introduction par L. Grandeau. Paris, Maison Rustique, 26 Rue Jacob. Unfortunately, this work is out of print, and I am indebted to the publishers for lending me their single remaining copy.

‡ Memorials des Manufactures de l'Etat' Tabacs, livr I. December 1884, pp. 5 *et seq.*

§ In our climate the number of days would probably be different.

MESSRS. MEAKIN AND CO., of Mussoorie, have decided to open a branch Brewery at Delhi. A piece of land has been taken up for the necessary buildings, and the work will be soon put in hand.

ERGOT: ITS CAUSE, PREVENTION AND REMEDY.

At a public conference in connection with the London Dairy Show, held last week, Professor Fream, B. Sc., F.L.S., F.G.S., Downton College, Salisbury, read the following interesting paper:— Most farmers are familiar with the name of ergot, and many have had unpleasant experience of its effects. What perhaps is less known is the actual appearance of this dangerous parasite as it grows upon pasture grasses. Acting upon invitation of the Council my duty to-day therefore is two-fold first to give some such general account of ergot as may be likely to prove of practical use; secondly, to request the attention of members to the specimens of ergoted grasses lying upon the table—specimens recently gathered by myself with the express object of enabling any one who has not hitherto been acquainted with the parasite to be henceforth in a position to recognise it. Indeed unless dairy farmers and cattle breeders generally can identify ergot when they see it, all instructions or suggestion as to evading the disastrous effects of the parasite are practically valueless. In these circumstances it is hoped that the exhibitions of actual specimens will prove more useful and instructive' and perhaps more acceptable, than the most accurate description accompanied by the most elaborate drawings.

Let me begin by asking you to notice the peculiar spur-like protrusions from which the fungus derives its name (French *ergot* a spur or cock-spur). These are so characteristic that when once known no other fungal pest upon grasses is at all likely to be mistaken for ergot. The spurs or ergots vary in size according to the species of grass attacked, but their shape and general appearance are always much the same, though the colour, which is at first of a somewhat ashen or dull leaden hue becomes at length purplish-black Very little examination will serve to shew that the ergots have usurped the place of the grain or in other words that the structure which, under normal circumstances, should ripen into the fruit or grain or so called 'seed' of the grass is replaced by the hard dingy-looking protuberance, called ergot. This is the stage in which the parasite is dangerous, and when its consumption by in-calf cows is likely to load to abortion bringing in its train, annoyance, disappointment, and loss.

It is foreign to my purpose on this occasion to discuss the life history of ergot. Sufficient information on this point may be found in a paper 'On Ergot as a cause of Abortion in Cattle," which I communicated to the current number of the *Journal* of this association. With reference, however, to a question which I recently saw propounded in the agricultural press, as to whether ergot might not be due to an insect, I may, without any hesitation answer, No. The life-history and the characters of ergot are such as to place it most unequivocally in that extensive and abnormal sub-division of the plant-world termed the fungi. It is as truly and undoubtedly a fungus as are the famillar mushrooms and toadstools of our meadows and woodlands, or the smut and mildew of our corn crops, or the bacilli which are now known to play so important a part in the spread of disease, or, again, as the moulds that grow and thrive upon cheese.

Special attention is invited to the fact that ergot only attacks the ovary or young grain, of grasses. From this circumstance may be drawn two very obvious but practical conclusions: In the first place that it is useless to look for any indications of ergot upon the stems or leaves of grasses; in the second place that the only period during which ergot can be found growing upon a grass is, when the latter has expended its flowering-head or panicle; a grass before flowering is quite free from ergot. I venture to lay some little stress on this point inasmuch as a full comprehension of it would have prevented several members of the association from sending me last autumn blotched portions of stems and leaves of grasses (but no panicles) with inquiries as to whether the disfigurements were due to ergot. As a matter of fact rust was the cause, whilst in the absence of panicles, it was impossible to say anything about ergot.

Since, then, ergot is only to be found in the flowers of grasses, little danger need be apprehended from it during spring and early summer. But from midsummer down to the end of the year precautions are necessary. The earliest date on which I have actually detected ergot has been in the first week of July, but I think that by careful observation it may be possible to discover it earlier. Obviously, it may be expected to appear at different times on different species of grass, according to their time of flowering; thus it may be looked for earlier in sweet vernal or in foxtail than in timothy grass. The later flowering grasses, and those whose 'bents' remain standing far into the winter, afford means whereby the presence of ergot may be rendered possible almost till the return of spring. Excepting in very sheltered places however, the boisterous winds of November possess sufficient violence to detach the ripe ergots from the positions they have usurped, so that they fall into stagnant water or upon moist earth, and there remain till the warmth of approaching summer causes them to germinate, and to discharge into the air their myriads of microscopic spores, some of which, coming into contact with the expanding florets of grasses, alight upon the ovaries, as a result whereof these latter, instead of ripening into the grain or 'seed,' develop into new ergots.

Having shown that the presence of ergot may fairly be looked for, during about half the year, I pass on to notice the localities in which it may be expected to occur. These are neither the regularly-mown meadow nor the well-grazed pasture. In the former, the grasses are cut too early to permit of the development of ergot, whilst in the latter the grasses are seldom allowed to attain the flowering stage which, as I have already explained, is an indispensable antecedent to the appearance of ergot. But the boundaries of meadow or pasture are frequently such as to favour in the highest degree the rapid development of ergot. A stagnant ditch, overshadowed by a hedge, seldom fails to afford ergoted grasses at the proper season. Similarly, a damp, low-lying spot in a grass field, where the herbage is rank and sour, is a locality which need rarely be searched in vain. Badly-drained grass lands, therefore, are favourable to ergot, and it follows that thorough drainage is a radical remedy for reducing the presence of the pest to a minimum. Roadside ditches constitute a very favourite habitat of ergot, and in such localities I have seen it growing in the greatest profusion. Cattle in passing along roads and lanes bordered by such ditches obtain easy access to large quantities of ergot. Stagnant water and sluggish streams appear to be much more favourable to the growth of ergot than do swift-flowing streams, probably because in the latter the velocity of the current would sweep away any ergots that happened to come under its influence, whereas in the former cases the ergots would remain where they had fallen and germinated in the following season.

The presence of ergot having been detected in a locality to which in-calf cows have ready access, the question arises as to what a farmer had best do in such circumstances. He would probably not do amiss if he were to engage an active sharp-eyed boy, and instruct him by means of specimens as to the appearances whereby he will recognise ergot, at the same time cautioning him not to mistake merely discoloured glumes for the hard ergots. The boy should walk through the infested locality twice or thrice a week, carrying with him a box in which he would place all the ergoted panicles he could find, and these should be taken into the house, dried and thrown on the fire. The cost in such case would be trivial, and I believe, that a steady prosecution of this plan throughout a season would materially lessen the quantity of ergot in the same locality in the following season. It would be more effective still if the occupants of several adjacent farms would co-operate, for a considerable district might in this way be cleared of ergot. If, on discovery an attack of ergot should be found to be so widespread and severe that hand gathering would be impracticable, in calf cows should be removed from the locality affected. The method of procedure, therefore, is to remove the ergot out of reach of the cows, but, failing this, to keep the cows away from the ergot

In this country any efforts to exterminate ergot must be voluntary, though this is not the case in all parts of the empire. In the Province of Manitoba, for example, farmers who allow certain specified plant pests to flourish on their holdings are punishable by fine. Very much good might be done if there existed some organisation whereby village schools could be provided with typical specimens of ergoted grasses accompanied by a few simple printed explanations and instructions. The same system might with advantage be extended to other farm pests, and thus afford to village children object lessons at once attractive and useful.

As the autumn advances and the close of the grazing season approaches, a special source of danger arises from the circumstance that pastures begin to fail and cows find an increasing difficulty in obtaining a sufficiency of food. Then it is they begin to graze in spots which they have previously shunned and to seek for food in the damp herbage amongst which ergot luxuriates. Conditions better calculated to induce abortion can hardly be conceived, and, once commenced amongst a herd of in-calf cows, abortion may extend indefinitely by mere sympathy.

A common source of ergot is to be found in grass seeds, and it is highly important that all seeds whether for one or two years' lay or for longer duration, should be carefully examined before sowing. If any trace of ergot is detected, the entire parcel of seeds in which it occurs should, without hesitation, be rejected; it would be foolish to retain the parcel at a reduction in price, and it would be unwise to accept it even as a gift. The ergots occurring upon the finer grasses, such as florin have an appearance much resembling the dung of mice, and, being mistaken for this, they are regarded as harmless. Ergot is less uncommon than might be supposed in corn crops, and last July I obtained very fine specimens of ergoted wheat and barley. A series of abortions came under my notice last winter, in which, after inquiry and examination, I found that the dietary of the cows included barley awns amongst which ergot was fairly abundant, and was, I strongly suspect, the cause of the mischief. Hay again is not always to be trusted particularly if on account of wet weather the period of cutting has been unduly delayed. In such circumstances ergot may very confidently be looked for, and such hay should never be served to in calf cows.

It is unnecessary to discuss here the therapeutical properties of ergot. That it does produce abortion there is not the slightest doubt, and Dr. Johnson who has recently made a series of valuable observations in the West Riding of Yorkshire confirmatory, of this fact, will, I believe, shorty publish his results. It may prove convenient if I now briefly summarise what has been set forth in this paper:—

1. Ergot, a parasitic fungus attacks pasture grasses, weed grasses, and cereals. It never occurs on clover or other cultivated plants.
2. When eaten by in calf cows ergot is capable of inducing abortion, that is, premature expulsion of the calf.
3. Abortion thus commenced may extend by symyathy to other cows of the herd.
4. Keep a sharp look-out for ergot in sunk fences, ditches, and other damp situations, from June on wards.
5. Perseveringly gather all ergoted grasses; do not cut them down and leave them on the ground.

6. Carry away all the ergoted specimens and burn them; do not throw them on the rubbish heap.

7. Get in the hay crop before the grasses have had an opportunity to become ergoted.

8. Never sow grass seeds containing ergot.

9 Show your neighbours specimens of ergoted grasses, and invite their co-operation in exterminating the pest.

Finally, I may remark that though there are many causes of abortion, yet cases sometimes occur which are very difficult to account for. A cow slips her calf; she has been kindly treated, well housed and properly fed and why abortion should occur is a mystery In such cases I believe that ergot is very commonly the unsuspected cause and that by its baneful influence it leads to an aggregate loss of many thousands of pounds per annum amongst dairy farmers and breeders. It is to their interest, therefore, to suppress this abominable pest, and with the object of furthering this purpose, I shall feel glad if members will kindly take away with them for reference these specimens I have provided for their inspection.—*North British Agriculturist.*

COTTON AND WHEAT ADULTERATION.

A correspondent calls attention in a Bombay paper to the increase of mixing and adulteration in the cotton trade, which, he declares, is seriously damaging the trade. We believe that in the Indian cotton trade, as well as in the wheat trade there is a very large amount of adulteration and mixing practiced, which may profit unscrupulous dealers in India for the time being, but which must militate seriously against the legitimate development of the trade, by handicapping the Indian products in European markets. The fault lies with the merchants. It is all very well to say the cultivators are to blame, and to cry out that the Agricultural Department does not perform its duty in the matter; but the cultivator only regulates his proceedings according to the trade demand, and the Agricultural Department is powerless to secure that only pure and unmixed wheat or cotton shall be sent to market, when mixed and adulterated qualities find ready sale and yield the largest profit. In the matter of cotton especially, and at Bombay in particular, the merchants themselves are to blame for the injury done to their trade. Government did its best to protect them; but they refused to be protected; vowed they could protect themselves more effectually and at less cost; and would not rest until they had secured the abolition of the Cotton Frauds Department. The Government, and Mr. Ravenscroft in particular, who was then a member of the Bombay Government, gave way very reluctantly, and the Department was sacrificed to the Bombay merchants' professed love of the *caveat emptor* principle. Mr. Ravenscroft predicted that the merchants would be forced to go back to Government before many year's had passed, and ask for a reintroduction of the protective system. We think there is little doubt that their action in forcing the hand of Government was unwise, though they may be lothe to admit it, and that the trade has suffered and is suffering from the extent to which adulturation is carried. Much the same principles apply to the wheat trade, which, enormously as it has grown in spite of obstacles, would be capable of much greater development if unmixed and clean wheat could be shipped from India instead of the present mixed and dirty grain. It was stated the other day that concern had been excited amongst Australian wheat growers by the prospect of Indian wheat underselling them in their own market But those who have tried shipping Indian wheat to Australia know that no great trade is likely to spring up, so long as Indian wheat has to be shipped in its present dirty condition. Here again Government has displayed a disposition to do what it can for the trade But the trade will have none of the Government help. No useful results can be expected from efforts of the Agricultural Department to induce the cultivators to exercise greater care in keeping their wheat clean, and not to mix the varieties, if the merchants, through their buyers, work the other way, and tell the ryots that they prefer dirty and mixed grain. We hear that this is known to have been done. If it is so, the merchants are very short-sighted and very blind to their own true interests. Enquiry should be made in the matter, and if it is found that merchants are really adopting a course which must damage the prospects of the trade, for the sake of present gains, by a mode of dealing that can scarcely be called honest, it may be matter for consideration whether the Government, in the interests of the country, whose prosperity is so largely dependent on its agriculture, should not take measures to protect and foster the trade in spite of the merchant.—*Indian Daily News.*

MINERAL PRODUCTION OF THE UNITED STATES.

Mr. D. T. Day, Chief of the Bureau of Mineral Statistics of the United States Geological Survey, has given out a condensed statement of the national mineral production for 1885 The important general fact it shows is that while there was a continuous decrease in the value of such products in 1883 and 1884, there was an increase in 1885, most marked during the latter half of the year, and therefore promising to extend into future statistical statements. The annual total value of such mineral product during four years past are given as follows:—In 1882, 435,216 689 dols.; in 1883. 452,166,748 dols, in 1884, 413,214,748 dols.; and 1885, 428,521,356 dols. Though greater in 1885 than in the preceeding year, yet it will be seen that the total for 1884 is below that of 1883 or of 1882. The following are some of the most important items in the comparison:—The total production (including local consumption) of anthracite was 1,052,792 tons in excess of that of 1884, and its value was 10,320,436 dols. greater. The total production of bituminous coal was 8,889,871 tons *less* than in 1884, but its value was 4,930,852 dols. greater. The total production of coal of all kinds shows a net decrease in tonnage of 7,837,079 long tons compared with that of 1884, but a gain in value of 15,251,018 dols., the increase in gain being due to an average increase of 25 cents per long ton. The total value is about the same as that of 1883.

Coke.—The total production of coke in 1885 was 5,106,696 short tons valued at the ovens at 7,629,118 dols The maximum production of coke in the United States was reached in 1883, when 5,464,731 tons were made. This declined in 1884 to 4,873,805 tons.

The production of 1885 shows a gain upon that of 1884 being within 360,000 tons of the make of 1883.

Petroleum.—The total production was 21,842 041 barrels of 42 gallons, of which Pennsylvania and New York fields produced 20,776, 041 barrels. The total value at an average price of 87¾ cents per barrel was 19,193,694 dols. The production showed a decrease of 2 247,717 barrels and 1,282 600 dols. in value from 1885.

Natural Gas.—No record is kept of the yield in cubic feet. The amount of coal displaced by gas in 1885 was 3,161,500 ton valued at 4,854,200 dols. In 1884 the coal displaced was valued at 1,460,000 dols. The yield has increased ten fold since 1883.

Iron.—The principal statistics for 1885 were: Domestic iron ore consumed, 7,600,000 long tons, value at mine 19,000,000; imported iron ore consumed, 390,786 long tons, total iron ore consumed, 7,990,786 long tons, pig iron made 4,044,526 long tons, a decrease of 53 343 long tons as compared with 1884; value at furnace, 74,712,400 dols., or 9,049 224 dols, less than in 1884. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications 93,000,000, dols., a decline of 14,000,000, dols from 1884.

Gold and Silver.—The mint authorities estimate the value of gold produced in 1885 at 31,801,000 dols., an increase of 1 001,000 dols. over 1884. The production is similarly estimated at 51,600,000 dols., an increase of 2,800,000 dols. over 1884.

Copper.—The production in 1885 including 5,086,841, pounds made from imported pyrites, was 170,962,607 pounds, valued in New York at 18,292,999 dols, at the average price of 10 7 cents per pound. The increase in pounds over 1884, was 25,740,667, in value, 503,312 dols.

Lead.—Production, 129,412 short tons. Total value, at an average price of 81 dols., per short ton at the Atlantic coast, 10,469,431 dols. a decline of 10,485 tons and 67,611 dols in value from the product of 1884. The production of white lead estimated at 60,000 short tons, worth at 5¼ cents per pound 6 300,000 dols.

Salt.—The total production in barrels of 280 pounds, was 7,038,653, exceeding the yield of 1884 by 523,716 barrels. The total value of all salt produced, was 4,930,621 dols, an increase of 732 887 dols. which was due partly to the increased value of the Michigan product and partly to the large increase in the production of Western New York.—*Planters' Gazette.*

A WOOD FOR TEA-BOXES.

[By Dr. H. Mayr, Lecturer on Forestry, Royal University of Munich.]

When I arrived in Darjeeling a few weeks ago for the purpose of studying the tree vegetation in Sikkim, I was very much surprised to find one of my best friends, the Japanese cedar, the *Cryp tomeria*, or better *sequoia japanica* cultivated on a large scale as an ornamental tree. The readers of the *Englishman* may kindly allow me to give them a few of my experiences about the Japanese "big tree." Inasmuch, as my remaks may possibly prove useful to such of them as may be planters in the mountain districts, and engaged in the cultivation of tea.

In Japan this beautiful tree, called *Sugi*, is largely cultivated all over the empire, but the localities where it is found growing wild are but few. They are scattered over the main Island of "Hondo," and are rarely seen by any European. The locality where the *Sugi* grows wild to perfection is a comparatively small mountain ridge lying beneath the fortieth parallel of north

latitude, the winter climate of which is marked by deep snow for four months, and a temperature which several times in this season, falls to 10 degrees below freezing point The tree is also said to be a native of China, and from that country the first seed was brought to Darjeeling by Mr. Fortune, who was sent by the Indian Government to bring to India supplies of the best kinds of the Chinese tea plant. In both Japan and China the tree is usually planted round Buddhist temples, where the finest specimens, towering up to a height of 250 feet may be seen.

The economic value of the *Sugi* in Japan is very great, as it grows in all situations and soils; in deep damp valleys, as well as on high mountain slopes. It is in fact one of the commonest, and also one of the most useful of Japanese timber trees. The water conducting sap wood is from two to three inches broad, and forms a ring round the dark reddish, sometimes black or bluish-striped heart wood. The wood is very light, soft and easily worked, and is used for all kinds of carpentery. The slight resinous smell of the wood soon disappears. There is a very broad leaved tree in Japan the Kiri or *Panlowina imperialis*, which produces a wood still lighter and of quicker growth than the *Sugi*, but Dr. G. King, Director of the Royal Botanical Garden in Calcutta, tells me this tree does not grow well in the wet climate of the Eastern Himalaya.

Owing to the frequent earthquakes and destructive fires which may lay waste a town of 3,000 houses in a few hours, the Japanese build their houses entirely of wood. The tree which produces the best timber in the shortest time is the *Sugi*, which for this reason is profusely planted, and at the age of scarcely 25 years the trees are cut down and shipped to the markets. The method of propagation on a large scale is most striking, and from a forester's point of view, is very important, all plantations being made by cuttings. For propagation in this way, the terminal piece of every branch is used. The cuttings are one-and-a half to two feet long, and are planted in the ground immediately before or at the beginning of the rainy season. The Japanese put the cuttings three to five inches deep into the ground, and the operation of planting is carried out by making a narrow hole in the soil with a stick of about the same thickness as the cuttings.

After acquiring roots, the young plants produced in this way grow very quickly. The *Sugi* yields a wood more suitable for tea boxes than most of the woods hitherto used in the Darjeeling district for that purpose. I am confirmed in this view by having seen tea boxes made of this wood in Darjeeling itself. Such a box was shown to me in the office of Mr. A. L. Home, Conservator of forests for Bengal. The reason why I now write these lines is to encourage the plantation of the *Sugi*, because it apparently grows well in all kinds of soil and exposure, from the Terai up to the region of the silver firs. It would be quite easy to grow, within a period of from 30 to 50 years, wood of the quality and dimensions required for tea-boxes, because the manipulation of planting this tree is so very easy, cheap and sure, if done in the way and at the season above pointed out.

In case these lines may induce some experiments to be made with timber, I will add that the young trees must be planted rather close together, scarcely four to five feet apart. for only in a dense growth does the *Sugi* soon loose its branches and produce a clean straight valuable shaft.—*Englishman.*

ARTIFICIAL QUININE.

Every mail from India, Ceylon and Java now brings us numerous letters from cinchona planters who are alarmed lest they should "find their occupation gone" in consequence of Mr Cresswell Hewett's alleged discovery, and the gist of all these communications is the question whether Mr. Hewett can substantiate his statements. We are obliged, however, to try our reader's patience still further, for it is impossible to reply definitely at present, the evidence being conflicting and conclusive, but for our own part we must say that Mr. Hewett's proceedings hitherto are not calculated to support the theory that he has achieved one of the most important discoveries of the day in chemical science. In our last issue we quoted from the *British and Colonial Druggist* a narrative of events, showing how he had played fast and loose with Dr. Burton and Messrs. Burroughs, Wellcome, and Co., and now we append an account of what has occurred subsequently from the same source. It is impossible, we think, to rise from a perusal of this statement with any feeling of confidence in Mr. Hewett's ability to demonstrate his discovery on a commercial scale, for if he could do so, there was no sufficient reason why he should draw back from the contract entered into with Dr. Burton and Messrs. Burroughs, Wellcome and Co. But let our readers judge for themselves.

As it stands at present, the matter in its general bearings is not very unlike some of those triangular battles which are frequently fought out in our law courts, although it is quite possible that it may become yet more multiplex as to parties and complex as to evidence, a little later on. Some persons think it quite likely that Mr. Cresswell Hewett has succeeded in the economical synthesis of quinine; others believe that as so many workers in the domain of molecular substitution have done before, he has made an egregious blunder; a third do not hesitate to declare the whole thing a hoax, and they would employ stronger language, if evidence had been adduced tending to show that the "discoverer" had made any material profit by the transaction up to the present date.

The sum and substance of the latest information amounts in general terms, to the following —Mr Hewett considers himself at the present time to be free and untrammelled in every respect as regards his mode of dealing, with the subject of artificial "quinine" "I did not intend the original announcement to appear" said he, "nor did I authorize its publication. People may say and think what they please for a few weeks, and as I have not asked any one for money, who can complain?" He proceeded—" Meanwhile we are building—my factory is building, Sir—and when a little more advanced, I'll take you to inspect it." We are informed that the money for the initial manufacture had been privately subscribed by a few members of his own family, including an Admiral in her Majesty's Navy · and that "The Atlas Quinine Company" which is, practically, "Cresswell Hewett and Co," were open to advance orders for quinine. These, before very long, they would be able to fill, and would do so at the best terms they could get, under the current price.

Mr. Hewett would, so he told us, have willingly proceeded with Dr. Burton and Messrs Burroughs, Wellcome and Co., upon the basis of the draft agreement published in our last issue, but for a certain action of Mr, Bland's in connection with his (Mr. Hewett's) solicitor which so greatly displeased the latter gentleman, that he instantly advised his client to break off the negotiations. Mr. and Mrs. Hewett then visited Utrecht, Heidelberg and some other places "on the Continent," making certain purchases and arrangements thereat, and demonstrating both at Utrecht and in this country upon a small scale "the practical feasibility of the quinine manufacture."

Those demonstrations resulted according to our informant, in the production, within a few hours, of "about 1 pound 13 ounces of artificial quinine," and this part of the conversation was concluded by Mr. Hewett with the trenchant remark: 'Now people don't usually give a thousand pounds away for nothing, do they? Well, go to the bankers, Lloyd's, Barnett's and Bosanquet's Bank, Limited, 60 and 62, Lombard-street, E C. and they'll tell you £1,000 has been paid in for me because of this demonstration!"

We have since seen the manager of Lloyd's bank, and the substance of the information, courteously afforded, is that a gentleman of the name of Cresswell Hewett, was "very respectfully" introduced there a few weeks ago, and has opened an account, several sums of money having been paid in to his credit.

Our contemporary publishes an analysis of the sample received from Mr. Hewett which he stated to be "artificial quinine" synthetically produced by him, and adds, "It cannot be said that the results obtained by us at all strengthen the case for Lincoln's Inn. The sample in question certainly consisted for the most part of sulphate of quinine, over 70 per cent of that alkaloidal salts being present, but, reasoning upon *a priori* bases alone it certainly strikes us as a coincidence, to say the least, little short of marvellous, to find that a sample of "sulphate of quinine," purporting to have been synthetically built up from materials in no way connected with cinchona bark, should contain just the very identical varieties of impurity or foreign matter, which we expect to see, and do habitually discover, in the alkaloid when extracted from the cortical envelope of the *cinchona officinalis* and its allies." At this point we can most appropriately leave the question.—*Planter's Gazette.*

THE COLOMBO SCHOOL OF AGRICULTURE.

The first public distribution of prizes in connection with the School of Agriculture, which was started some three years ago, took place at the School premises—the late Normal School—Cinnamon Gardens, the other afternoon.

His Excellency Sir Arthur and Lady Gordon presided, and the proceedings commenced by Mr. Ashley Walker, the Principal, reading the following—

Report.

The Colombo School of Agriculture was opened in January 1884, and hitherto there has been no public prize day, the Director desiring that the school should be established on a firm basis before any public attention was drawn to it. Now, however, that the training of the first batch of students has been completed and very satisfactorily completed, the prohibition of publicity has been removed, and on behalf of the students, I welcome your Excellency very heartily to this, our first prize day, and we thank you Sir for the great honor you have done us in coming here to-day. A short history of the school may not be out of place. It was first proposed by the present Director in 1883, and it was very generally predicted that it would be a failure.

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A WEEKLY

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 29TH DECEMBER 1886]

Madras.—General prospects good.

Bombay.—Slight rain in parts of Poona Standing crops injured by blight in parts of the Deccan by cloudy weather in parts of Broach, and by frost in parts of Hyderabad. Fever in parts of twelve, cattle disease in parts of nine, and small pox in parts of three districts.

Bengal.—No rain fell during the week. *Amun* harvest is proceeding, and is yielding a good outturn. All cold weather crops, including poppy, are in good condition. Transplanting of *boro* paddy has begun, and in Behar lands are being prepared for indigo. Fever and cholera have somewhat abated, and the general health is fair.

N.-W. P. and Oudh.—Weather generally cloudy. Rain needed for standing crops in most places. Irrigation going on. Prospects of both *rabi* and poppy crops continue favourable. Markets are well supplied and prices fairly steady. Public health good ; a few cases of fever and cholera reported from some districts.

Punjab.—Rain has fallen in Delhi, Amballa, Jullandur, Ferozepore, Amritsar, Sialkot, Lahore, Dera Ismail Khan and Peshawar districts. Small-pox prevailing in Peshawar, elsewhere health good. Prices rising in Delhi, Amballa, and Ferozepore districts: stationary elsewhere. *Rabi* sowing nearly completed.

Central Provinces.—No rain during the week. Threshing of *kharif* crops continue. *Rabi* promises well. Fever in places. Prices steady.

British Burmah.—Public health generally good. A few cases of cholera reported from five districts. Cattle healthy. Crop prospects continue good. Reaping progressing.

Assam.—Gathering of *matikalai* over. Weather seasonable. No rain during the week. Reaping of *sali* still in progress. State and prospects of the crops generally good. Cattle disease has broken out in Cachar, and 101 cows and 13 buffaloes have died. Cholera on the decrease. Public health good. Prices steady.

Mysore and Coorg.—No rain during the week. Crops in good condition. Prospects favourable. Public health fair. No material change in prices.

Berar and Hyderabad.—Weather cloudy. Cotton-picking and *kharif*-harvesting progressing. *Rabi* crops in good condition. Reaping of *abi* crops and preparation for *thabi* crops are in progress. Fever and ague prevalent in all taluks. Prices steady.

Central India States.—Weather rather cloudy. *Rabi* crops good. Health and prospects good. Prices stationary.

Rajpootana.—Weather seasonable. Beyond a few drops in Bikaneer and Sujangarh, the week was rainless. Tanks and wells decreasing. Crops progressing favorably. *Rabi* sown, prospects good. Small-pox continues in Kerowlee. Cholera raging in Sujangarh. 56 deaths up to 22nd December, otherwise public health good. Prices fluctuating.

Nepal.—Prospects fair.

Editorial Notes.

THE largest cargo of wheat ever carried by a single steamer arrived in Liverpool from Bombay three weeks ago. The vessel was the *Cran*, and the cargo consisted of no less than 200,000 bushels of wheat, with the enormous weight of nearly 5,100 tons. The event fitly symbolises the rapid development of India's wheat trade.

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IF we are to judge from the Budget estimates, there is every reason to believe that Ceylon will record a deficit during the current year, as the income is estimated at Rs. 1,27,00,000 and the expenditure at Rs 1,30,71,558. The deficit is attributed to the large increase in the amount now payable in England for pensions owing to the depreciation of the rupee, the expenditure under this head having doubled within the last five years.

THE report on the prospects of the wheat and oil-seed crops of the North-Western Provinces and Oudh for November is very favourable so far. Rain continued till late in October, but with intervals sufficiently long for ploughing and dressing of the land. Germination is excellent, except in places where it rained immediately after sowing. On the whole, the prospects up to 30th November were very fair The area is about [illegible] of last year.

THE first report on the prospects of the Bombay wheat crop up to end of November states that the estimates have been made generally up to end of November. The season is reported to be very favourable for wheat, though the sowings were unusually late hence the figures are incomplete. The area, if anything is larger than the average in all parts, but not fully reported ; hence a detailed comparison has not been made. The latest intelligence states that cyclonic and abnormal rain fell in the Deccan and parts of the Karnatak about 10th December, which must have done harm by flooding, as in Ahmednugger ; but the seedlings are too immature to be injured by rust, which is usually induced by December rain. No actual damage is, however, reported.

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SUGAR manufacturers in the Dutch East Indies owe a debt of gratitude to the Minister of those colonies for the steps he has taken to relieve, in some measure, the present depressed state of this industry in Java. We understand that he is about to introduce a bill to suspend the export duties on Java sugar, and also proposes to give the sugar manufacturers the option of paying only one-half of the duty in 1887, and the four following years, the other half to be paid in yearly instalments of one-fifth, in the years 1892 to 1896. He has, however, refused to grant any relaxation in current payments. But even this concession ought to be hailed with satisfaction by the Java sugar planters.

THE accounts of the trade by land of British India with foreign countries for the first five months of the current year, show that the total value of imports was Rs. 1,81,23,258, against Rs. 1,91,09,479 in the same period last year ; and that of exports Rs. 2,50,43,809 against Rs. 2,85,48,050. The total value of trade was therefore Rs. 5,31,67,067, against Rs. 4,76,57,529. The decrease in the imports is chiefly confined to Upper Burmah,

Karennee, Zimme, and Siam, as there was a satisfactory increase in that with Nepal and Sikkim. The increase in the exports is mainly with the Trans-frontier by rail, but there has also been an increase in the trade with Seistan. Cabul, Bajaur, Cashmere, Nepal, and Sikkim.

THERE is an impression abroad that tea planting "doesn't pay now-a-days." But this is not borne out by actual facts, for we gather from an official report that there was a considerable increase in the extent of land taken up last year under the Assam settlement rules by tea planters in Assam. In the previous year the leases issued numbered 210, covering an area of 12,408, while the number of fresh leases last year was 317, covering an area of 23,338 acres. This apparently indicates a more prosperous condition of affairs in the tea industry than might be expected, especially as the Assam land revenue report observes, that those who have taken up the land propose to cultivate it.

We have received the first number of *Indian Engineering*, which has come out punctual to time. It is edited by Mr. Pat. Doyle, C. E., a gentleman of wide and varied experience, and one who has been before the public for many years now, If we are to judge from the number before us, which is brimful of information of a practical and scientific nature, with papers on special subjects of interest to the engineering profession in particular, there is every reason to believe that it will serve the purposes for which it has been started, admirably, The general reader will also find much to interest him in *Indian Engineering*. We wish Mr. Doyle every success in his undertaking.

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THE total value of the foreign trade of Chittagong last year amounted to Rs. 82,94,672 as compared with Rs. 83,10,652 in the previous year, the decrease being chiefly due to a falling off in the imports, as the exports show a satisfactory increase. The coasting trade of the port, however, fell off by Rs. 7,20,377. The trade of the Orissa ports shows a decrease, as compared with the previous year, of Rs. 17,30,031, or 9·2 per cent. There was a slight improvement in the foreign trade of Balasore, but no increase in the coasting trade took place, and the same may be said of Cuttack. As regards Pooree, both the foreign and coasting trade were in a declining state during the year. The trade at the port of Naraingunje fell off very largely as the imports decreased in value by Rs. 1,35,840, and the exports by Rs. 13,70,095.

THERE is no doubt that the value of honey as a wholesome diet is not known sufficiently—especially out here. The following observations by a correspondent of an American paper fully bear out our own views on this subject :—"Honey is the only commercial sweet which is given us as a purely natural product. The methods through which the different sweets are produced warrant me in saying that the future will prove that honey can and will be produced so as to compete with other commercial sweets, as an article of food and for other uses. Indeed, I feel very certain that honey is to take a much higher ranks as a pure, wholesome and desirable article of food than it now holds."

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To encourage and foster local manufacture and trade is one of the first duties of a Government, and it is the one duty which the Government of India has so sadly neglected. The action of other Governments in this respect is worthy of imitation here ; thus we see that the Government of Victoria has taken a thoroughly practical step for the encouragement of the manufacture of worsted cloth in that colony. It has offered a bonus of £5,000 for the manufacture of the first 10,000 yards of worsted cloth in the colony before July the 31st 1888. The terms on which the bonus is to be given are, that the cloth must be the manufacture of one mill only, premanently established in Victoria ; must be wholly manufactured from woollen yarn made in Victoria of Victorian-grown wool. It must also be of good marketable quality, so as to show that the applicants have permanently established the manufacture of worsted clothes in the colony. This is something like business. We should like to know how many bonuses of £5,000 the Government of India has offered for the encouragement of any one industry of the country.

IT can hardly be complained by the public of Vermont, says a contemporary, that an Oleomargarine Bill which the State House of Representatives has just passed is in sufficiently stringent. It prohibits the sale and manufacture of spurious butter under a fine of five hundred dollars. It also prohibits its use in hotels, eating-houses, and boarding-houses—under a similar penalty—unless the owner thereof exhibits a placard with letters three inches large, "Oleomargarine used here." Such persons are not to be held liable under the Act. The Bill, however, omits to state how the lodging-house-keepers willing to exhibit this portentous notice are to obtain their oleomargarine, since it is made penal to sell or manufacture the article. When the Americans take up a thing in earnest they are admirably thorough in their treatment of it. What would be the astonishment of an English hotel or boarding-house keeper were a law passed that they must exhibit a notice in letters three inches long—"The eggs used here are not new laid, but French," "The butter is second-class Irish," "The meat is not of the first quality," or "The milk is watered" The singular thing is that the Americans, who pride themselves upon being a free people, should submit to grandmotherly legislation of this kind, and that the tendency towards interference by the State in matters of eating and drinking is steadily upon the increase.

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 29th December 1886.—During the past week there has been slight but general rain over the eastern and central districts of the Punjab where the *rabi* sowings are now nearly completed. In the N-W Provinces and Oudh the *rab* crops are being irrigated, and though in good condition, would be benefited by rain. Cloudy weather has prevailed in Hyderabad, the Central Provinces, Central India and Rajpootana ; the crops generally promise well, but rain is wanted in Rajpootana. Prospects remain favourable in Madras and Mysore, though rain is needed in some districts of the former. In Bombay the standing crops have suffered in places from blight, cloudy weather and frost. Prospects in Bengal, Burmah and Assam continue favourable. Harvesting of paddy and late *kharif* crops is proceeding in Madras and Bombay ; cotton is being picked in the Central Provinces and Hyderabad ; the *amun* rice harvest is yielding a good outturn in Bengal, and the winter rice is being reaped in Assam. Prices have risen in a few places in the Punjab and Rajpootana ; elsewhere they are fairly steady. Public health is improving in Bengal ; cholera and small-pox exist in most provinces, but there is no abnormal sickness. Cattle disease is reported from Madras and Bombay.

"PASTEURISATION" may soon be expected to take up an important position in India. Our General Superintendent of Horse-breeding Operations in India has paid a visit to Paris with the object of studying animal vaccination as adopted by M. Pasteur, and on his return to this country reported to the Government of India in favour of adopting the use of the vaccine, recommending the establishment of laboratories for its production and cultivation. But no action was taken in the matter at once and the subject was for a time dropped. We now learn that a private individual, Mr. Barnup, of London, having been in negociation with M. Pasteur and his associate with respect to "Pasteur's Vaccine for Anthrax," and having secured from him the monopoly for India, purposes founding this year a laboratory in India to produce the vaccine, the preparation of which will be under the direct management of M. Pasteur, who will furnish the initial vaccine from Paris. This done, he promises to furnish to Government or to private persons vaccine in certain doses to suit sheep, swine &c. and also cattle and horses ; also special doses for elephants. The present idea is to produce this vaccine fresh at various points, where the demand will be large, simply charging so much per dose according to the size of the animal.

In America it has come to be recognised now, that what th growers of wheat are likely soon to lose in the cultivation and export of that important cereal, can be compensated for by turning their attention to flax, which has too long been neglect ed. From an interesting paper, which we reproduce in anothe column, it will be seen that great efforts are being put forward to impress cultivators with the importance of flax as a field crop. It has been a puzzle to us why the flax—fibre industry has not been developed to any extent in this country. The Euro peon plant that yields the flax of commence, (*Linum usitatissim um*), is identical with our linseed plant, but the latter is only grown as a field crop for the sake of its seed. It is not planted sufficiently close together to encourage the plants to develope a single stem, as it is only thus that it would be fit to be utilized for its fibre. As at present grown, the plant branches, and is of course only fit to bear seed. Considering the importance of the linen manufacture industry in Europe, an attempt might be made to induce Indian cultivators to grow the linseed for fibre. Why should India not supply the markets of Europe with flax fibre? At any rate, there is no reason why we should go to Ireland for our linen, when we can grow the plant and manufacture the fibre and cloth here. The point is well worth serious consideration.

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On the subject of cooked *versus* uncooked food for stock, a writer in the *American Agriculturist* makes the following remarks :—" I see you are cooking for your hogs," said the Deacon, " while you pretend to have great faith in our Agricultural experiment stations, and yet, so far as I have seen, the experiments show that cooking does no good. At the Kansas agricultural college last winter, Prof. Sheldon fed hogs for ninety days on cooked and raw shelled corn. The pigs having cooked corn ate sixty-and-a-half pounds of corn each per week and gained seven and three-quarter pounds ; the hogs on raw corn ate seventy-four pounds of corn each per week, and gained eleven and three-quarter pounds. In other words one hundred pounds of cooked corn gave an increase of thirteen and one-third pounds, and one hundred pounds of raw corn an increase of fifteen and four-fifths pounds." " This experiment," said I " will not satisfy the advocates of cooking. It proves too much. It will hardly be claimed that cooking corn, potatoes and other starchy food, actually does harm. Prof. Sheldon gives us the explanation. The weather was very cold, and the cooked food if not eaten immediately, froze solid. The pigs having the cooked food did not eat enough. Too much of the food was used to keep up the animal heat during the 'terrible blizzard' the Professor speaks of."

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The same writer makes the following observations on the subject of manuring and planting :—" What do you mean by more room or more manure?" asked the Deacon.— " Simply this," said I, " you have for years told me that I planted corn and potatoes too thick. I drill my corn in rows and also plant potatoes in rows, three feet apart, and drop the potatoes about fifteen inches apart in the rows, You plant corn in hills, three-and-a-half feet apart, with three to four plants in a hill. Potatoes you plant, in hills three feet by three feet. If the land is highly manured the thicker planting will give the larger yield per acre. But on ordinary land without manure, planting in hills is the, better way."—" I am glad you acknowledge it," said the Deacon."—"I have always admitted it," said I "and what is more, I have extended the same principle to other crops. I believe I was the first writer to recommend planting asparagus and cauliflower wide distances apart, and gave my reasons for it, and it was not until several years afterwards that I found that practical gardeners were adopting the method with great success. Of course, I am not vain enough to suppose that they got the idea from me. Theory rarely, if ever, gets the start of practice. But the fact is worth mentioning, because it shows that the theory is correct. My idea was that cauliflower asparagus, celery and many other plants needed excessively rich land, or large quantities of water. Within certain limits, a liberal supply of water would take the place of manure and *vice versâ*. Plants pump up water out of the soil. The more pumps or plants we have on a given area, the less water would there be for each pump or plant. You cannot increase the supply of water, but you can easily reduce the number of plants. Instead of planting cauliflower in rows two feet apart and twelve inches apart in the row, put them three feet apart. In the one case you would have 21,780 pumps on an acre, and in the other 4,840 pumps. Some asparagus growers find, from experience, that it is better to plant five feet apart, and thus reduce the number of pumps to 1,742 to the acre. They want to be sure that none of the pumps shall ever go dry."

The report of the Board of Revenue on the administration of the salt department in Bengal for the year 1885-86, shows that the Imperial receipts from the import and excise duty on salt amounted to Rs. 1,89,96, 007, against Rs 2,02,02,459 in the previous year, while the provincial receipts from rent of warehouses and miscellaneous sources was Rs. 1,90,97,482, as compared with Rs. 2,03,27,015 during 1884 85. The Imperial charges amounted to Rs. 2,23,534, and the Provincial to Rs. 18,180, against Rs. 2,50,338, and Rs. 21,113 respectively in the previous year. It will thus be seen that the results of the year show a decrease of Rs. 12,29,523 or 6 per cent in the receipts,and Rs. 29,737 or 10·9 per cent in the charges, as compared with the previous year. Notwithstanding this decrease, the net approximate revenue amounted to Rs. 1,88,55,768. There was a decrease under all heads of receipt ; that under 'duty' was due to smaller clearances, while the decrease under charges was chiefly due to smaller refunds of customs duty on salt. The total quantity of salt in stock at the beginning of the year was 15,41,259 maunds against over 20,00,000 maunds in the previous year, over 94 thousand maunds were imported and manufactured during the year. Importation was confined to the ports of Calcutta and Chittagong. In the former, salt was imported from the United Kingdom, Hamburg, Bombay, the Arabian and Persian Gulfs, Italy and Port Augustus, and in the latter from the United Kingdom, Madras and Akyab. Salt was manufactured under the excise rules in Orissa only, and shows an increase of 4 8 per cent over the figures for 1884-85. The decrease in the sale of excise salt in Cuttack is attributed to an illicit trade carried on in the district, " unsuspected by the executive and unhindered by the police." But as this department in Orissa has now been transferred to the control of the Commissioner of Salt Revenue, Madras, it is hoped that the trained supervision to which it is now subjected, will stamp out illicit dealings.

No one in this country would suppose for a moment that Indian corn-cobs could be profitably utilized in any way after the grain has been removed ; yet the Americans have found a very good use for these seemingly useless things. A New York contemporary says on this subject :—Deep gullies can be kept out of " washy " land only by closing the little water-ways after each heavy rain. Delay makes the work greater, not only because the larger gully will require more material, but smaller gullies will form toward it which must be closed, and which make it more difficult to retain obstructions in the larger gully. For closing small water-ways, corn-cobs from the feeding floors serve an excellent purpose. These are usually water-soaked, or soon become so, and then the water will not move them. They do not interfere with ploughing or harrowing. The plough or harrow will pass through them and remove very few from their places, to which they can be returned easily. If brush is used it must be staked down, and either plough or harrow will pull the stakes and brush from their places. If more solid obstructions are opposed to the water, they suffer all the greater from the passage of implements. Many farmers neglect to fill small wash-outs after the fall rains, and, of course, fail to get them filled before the spring freshets begin, and before the washing can be stopped large gullies are formed. If cobs are placed in the wash-outs late in the fall, they will become so compacted and firmly fixed until spring, that even the heavy spring rains will not remove them, while the winter thaws will bring enough soil to the water-way to fill the crevices between them, and thus aid in filling the gully.

Our go-ahead cousins across the Atlantic are turning their attention to the agricultural education of girls. Thus a writer in the *American Agriculturist* says: "It is gratifying to observe that the drift of opinion is not only towards giving our boy an agricultural education, but many thoughtful people are also casting about for schools which will educate the girls, too, that line, and will be helpful in their life work in our country homes. Certainly as long as man exists there must be country homes, and wives and mothers to preside over them; and how vastly important is it that the mistresses of these homes should be educated in the line that will enable them to lift their home life above one of mere drudgery. Statistics tell us that a very large per cent of the inmates of our insane retreats are the wives and daughters of farmers. Naturally the thought ful mind enquires why this is so. It is because the life of a woman on the farm is too often nothing but an everlasting round of the treadmill. Within the four walls of her home three hundred and sixty-five days in the year, from early morn until late at night, there is a continuous sameness in her duties with never a relief, never a moment to take the free air and sunshine. What wonder that after a series of years of such a life, tired nature succumbs, the nervous system is exhausted, and reason is dethroned? Naturally the question arises: How can education avert these calamities? We answer: It can make woman's hard lot easier in a thousand ways. We would educate the girls in such a way that they can step beyond the walls of their homes and make themselves useful. They should be familiar with horticulture in all its departments; bee-keeping can be made very profitable; the care and rearing of poultry are within their scope; besides a score or more of other useful accomplishments, by which a women educated—practically educated—in all these things, can earn enough to hire all the help she needs, both indoors and out, and often bring still more to the family treasury than her husband can from his farm, besides the comforts and the luxuries thus obtained from her enterprises; and what is of vastly more value to her and her household, she will get the sunshine and open air, retain perfect health and reason, live a long and useful life, rear her family in comfort, and who the world will rise up and call blessed. Does this seem like an idle dream? Those who are interested in the coming generations of women, who will live upon the farm can leave no more enduring monument to their memories than a school well established for their education in all those things that will make women something more than mere drudges or machines—make them noble, useful women in the highest, truest sense."

"RESHAM TATTWA." *

[Hand-book of Silk.]

It is a gratifying sign of the times that the attention of the natives of this country is being directed towards the adoption of independent trades and professions. It is still more gratifying to find that a scion of the aristocracy of the land, one born and bred in the lap of luxury, should come forward to point out to his countrymen a course of honorable and profitable career. The work before us is not the first fruit of his benevolent intentions. Kumar Sashi Sekhasewar Roy Bahadoor, the author of the work under review, has, through the *Krishi Karyalaya* at Tahirpur, caused an Agricultural and Art journal to be published, which is distributed gratis among the peasantry. He is the chief supporter of that useful magazine "Baisayika Tattwa," from which the article forming the subject of the book has been republished with some necessary additions and alterations.

The object of the present work is to draw the attention of the natives of Bengal to the advantages of silk culture. The author impresses upon his readers the suitability of the climatic and economic conditions of the country to the rearing of the silk worm, the worm which, according to an Indian agricultural adage, "lives on jungle leaves and pours forth coins of gold." He introduces the subject by tracing its antiquity to the times of the *Ramayan* and *Mahabharat* and *Manu Samhita*, where [illegible] references are made to garments manufactured of silk fibre. He gives short accounts of the silk trade as conducted in this country, in the olden and medæval ages, as well as in our own times, and proves conclusively that, by nature of the division of labor it involves, it is as suitable for the rich, as it is for the middle classes and the poor, and even for the female members of the community. The second chapter of the work deals with the feeding and rearing of the silk worms, and shows how easily and cheaply this can be done in this country. How the trade can be improved upon, forms the subject of the second part of the work, which as yet remains to be published, and which it has not been found convenient to incorporate with the present volume, as the latter has had to be brought out in haste to enable its being distributed free of charge among the general public on the occasion of the silk exhibition held at Rajshayi last year. It is due to the author to note that, after reserving half the number of copies published for gratuitous circulation, he has made over the copyright of the other half to the Tahirpore *Krashi Karyalaya*, of which he is the mainstay. The book under notice bears the impress of patient research, and is the result of the writer's personal practical knowledge of the subject. The efforts of the Kumar at popularizing the lucrativeness of the silk trade, deserve the warmest gratitude of his young countrymen, who can, in the most substantial manner, return their thanks to him by earnestly taking up the industry which has been so sympathetically brought to their notice.

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A NEW FORAGE PLANT.

"Kaffir Corn" is the name given to a new forage plant, which has been recently brought prominently to notice in the United States of America. From the description given of it by a Mr. J. H. Alexander of Augusta, Ga., in the *Rural New Yorker*, it would appear to be a very valuable forage plant, and one which it would be worth while introducing into this country. Mr. Alexander writes as follows regarding it:—

It is distinctly different in habit of growth from all other sorghums with which we are acquainted. The plant is low, stocky, perfectly erect. The foliage is wide. It does not stool from the root but branches from the top joints, producing from two to four heads of grain from each stalk. The heads are long, narrow and perfectly erect and well filled with white grain, which at maturity is slightly flecked with red or reddish brown spots. The weight averages about 60 pounds per bushel. The average height of growth on good, strong land is 5½ to 6 feet; on thin land 4½ to 5 feet. The seed-heads grow from 10 to 12 inches in length, and the product of grain on good land is said to reach 50 to 60 bushels per acre. It has the quality common to all the sorghums of resisting drought. If the growth is checked by want of moisture, the plant waits for rain, and then at once resumes its processes, and in the most disastrous seasons has not failed so far to make its crop. On very thin and worn lands it yields paying crops of grain and forage, even in dry seasons in which corn has utterly failed on the same lands. The whole stalk, as well as the blades, cures into excellent fodder, and in all stages of its growth is available for green feed; cattle, mules and horses being equally fond of it, and its quality not surpassed by any other variety. If cut down to the ground, two or more shoots spring from the root, and the growth is thus maintained until checked by frost.

The Kaffir corn may be planted in the latter part of March or early in April, in middle Georgia. It bears earlier planting than other millets or sorghums. It should be put in rows not over three feet apart, even on the best land and it bears thicker planting than any other variety or sorghum; it should be massed in the drill on good land for either grain or forage purposes, and also on thin land, if forage mainly is desired. The first seed-heads form at the top of each stalk, and as soon as these show the grain well, the joints next below the top send up shoots which yield the second, third and often fourth seed-heads. If grain chiefly is desired these heads may be all allowed to mature on the stalk, and then the whole stalk may be cured into fodder; for it is not even then so hard but that it will be easily cut up and well eaten by cows and mules. But if the crop is wanted mainly for fodder, it is recommended to cut down the whole stalk when the first seed-heads come into bloom, at which stage it cures admirably and makes excellent forage. The second growth springing at once from the roots will still mature a full crop of grain and a

second full crop of forage before the middle of October—that is in Georgia.

Kaffir corn is said to be as quick and early in its growth as the Minnesota Early Amber Cane—maturing seed about the same time. It is therefore reliable in any latitude in which the amber cane has been found useful as a forage plant, and by reason of the close massing of plants upon the land and the wide and ample foliage, the yield of forage is equal in quantity and superior in quality to any of the latter and taller-growing sorts, as the Rural Branching Sorghum, etc. The seed heads of Kaffir are well eaten by all farm animals, and no harm has been found to result from continuous liberal feeding on both the grain and the whole plant, green or dry.

The Kaffir keeps green, and the stalk is juicy and brittle to the last, and is not a hard and cane like growth as other sorghums usually are found to be. Its low and manageable growth, ease of cultivating and harvesting, are points distinctly peculiar to it, and it leaves no troublesome stubble behind, as most of the sorghums do. Therefore, it is a desirable variety as a general-purpose plant, for green feed, grain and dry forage on every farm, and for ensilage it should prove valuable. Flour from the Kaffir grain has been found more nearly analogous to wheat than any other grain of its class. It is darker, of course, but it is of like texture in the dough and in the cooking. For batter cakes, muffins, etc., it is excellent, having a slightly sweetish taste otherwise not distinguishable from wheat; and for buck wheat cakes it is esteemed by many who have eaten of it, as an improvement on the original.

SILAGE vs. DRY FODDER.

THE ensilage question is one which we have made peculiarly our own, as we look upon the system as a perfect God-send to India. Unfortunately, there are not wanting those who depreciate it—even among such as we would expect would do their very utmost to encourage the system throughout the land. One of the chief arguments used against silage—especially by scientific authorities—is, that the mere fact of pitting fodder entails a serious loss of nitrogenous or flesh forming constituents, as compared with fodder in its green, and particularly in its dry state. We have tried to combat this argument in every way possible; but when such authorities as Sir J. B. Lawes and others use it as militating against the feeding value of silage, the large majority cannot but accept those views as correct. Thousands have borne testimony to the fact that a silage diet has been found not only to increase flesh in animals to a much greater extent than dry fodder, but that it has had the effect of increasing the yield of milk in cows, and causing a larger formation of cream. Yet upon the inferences and conclusions to be drawn from chemical analyses, silage has been pronounced as inferior in feeding value to dry fodder. The following reply of Professor Arnold, at the Wisconsin Dairymen's convention at Richland, U. S. A. lately, when asked why three tons of silage have a feeding value of one ton of the best hay, will explain what we mean. He said :—

"In green, succulent foods the cellular tissues have not been converted into woody fibre, and in mastication and digestion all of the nutritive substances in these cells are quickly acted upon by the saliva of the mouth, and then the gastric juices of the stomach and all the nutriment is assimilated with only a minimum expenditure of force by the animal economy to digest it. The natural moisture of the plants, when green, also acts as a compensation, and requires but little besides the gastric juice to make the food fluid enough for digestion. With dry food nature is heavily taxed at all points to make good the loss of the juices or moisture of the food. The secretions of the mouth are called upon to moisten the dry food. The woody fibre of the plants must be broken down and disintegrated by the power of gastric force to set free the real nutriment of the food. This force is several times greater than is necessary when succulent food is fed. All this extra expenditure of force must be supplied by the animal, and therefore calls for an increased amount of food to make good this demand, or else the animal falls off in flesh. In ensilage there may be a slight loss in the carb-hydrate elements, and a gain is made in protein, and increased digestibility of the rest, which give feeding value to what has often been termed the water in ensilage. It is not only easily digested, but also helps to digest other richer foods, including grain; and thus adding the natural juices of plants to the mixed ration, aids nature to assimilate them without calling upon the digestive economy of the animal to do all the work. In the other cases, all this matter is dried down into a hard condition, and must have water to re-absorb it, freshen it up and dissolve it, which requires a good deal of time, and a good deal of extra force. If you take an apple, you will find the nutriment all in a soluble condition, and when you take it into the stomach it is ready to go into the circulation at once. If you dry that apple, all the nutriment becomes like raw hide, and it must be soaked up, and when you have done that, you have changed its condition; you can never get it back in the same condition it was before the drying was done and it takes more energy and force to digest that dry food than in its green state; that is the pith of the whole matter. The nutriment or the sugar in dry food are not necessarily changed by the evaporation of the water, but it is simply breaking the chemical union of the water with the rest of the compound, and that chemical reunion has got to be restored by energies of the stomach, which makes extra work and makes it slow. In feeding a cow you want to give her what she can eat in a given time. A dry feed may contain as much nutriment, but you cannot get as much out of it, because it takes so long to do it that the animal has got to support itself while it is being digested. The point is simply this, that in the green stage, the albumen and other matter is, to a large extent, already in solution in a condition in which when it is separated from the fibrous matter, it can be taken right into the circulation and appropriated. In wetting or steaming fodder, it will help considerably, but it will not overcome the change which the feed undergoes in the deslocation and soaking up again.

The foregoing is the best and most practical explanation of the question we have yet met with, and we commend it to the consideration of all who purpose undertaking ensilage experiments.

GARDENING IN CALCUTTA.

VI.

Plant Propagation.

PLANTS may be propagated in a variety of ways—by seed, by cuttings, by division, by layering, by grafting, by budding, by inarching, by gootee, &c., some of these forming the most interesting operations in the work of the garden. The beginner must not be disheartened if his first attempts at budding, grafting, or any of the other methods should turn out unsuccessful. It is only by practice and experience that success can be secured. All plants, trees, and shrubs in their natural state, with but very few exceptions, reproduce themselves only by seed, but many of these, when removed from their natural habitat, and cultivated in an artificial temperature, obstinately refuse to produce seed at all, and there are others which, although they produce seed freely enough, the product of it is so variable that it is really worse than useless. Under such circumstances we have no alternative, but to resort to one of the many artificial or vegetative means of propagation which present themselves to us, in order to reproduce or multiply any desirable species of useful or ornamental vegetation. And not only with these, but also with the majority of plants grown in our gardens with the exception of annuals, much valuable time is unnecessarily lost in attempting to raise them from seed, when they can easily be propagated by one or more of the many artificial means that are at our command

Cuttings.

This is by far the most popular method of increasing a vast number of species, and is as a rule not only the most certain, but also the most expeditious way of doing so; and it has further the additional advantage of exactly reproducing the parent plant from which it is taken. The methods of multiplying plants by cuttings are extremely variable, and must be adapted to the particular class of plants that it is desired to propagate. This is a fact that is very much overlooked; too many imagine that the treatment under which one species may be grown should be applicable to all. A greater mistake could not possibly be made. A careful study of the habits or nature of any particular class, and a certain amount of experience, will soon show what are the best means by which it may be propagated or grown successfully. Cuttings may be made in an infinite variety of ways. A cutting may be described as any portion of a plant that is separated from the parent, and induced to form roots of its own, whether it be from a stem, root, tuber, bulb, corm, leaf, or even a portion of a leaf, according to the class of plants to be operated upon. Before proceeding to describe the various modes of propagating by cuttings, it should first be stated that if it is intended to raise plants in any quantity, it will be necessary to provide some kind of structure adapted to the purpose. Bell glasses

or ordinary glass shades answer very well if required only for a very few cuttings; but these at their best form but a very primitive method of working. There are not many amateurs who would care to go to the expense of constructing a propagating-house on a large scale, but a very good substitute may be made at a moderate cost, and which will answer the purpose equally well. This is in the form of a double-span frame, similar to those which in England are known as plant protectors. A frame, say eight feet long, five feet wide, eighteen inches high at sides and two feet at the centres, is a very convenient size, and large enough for the requirements of most private gardens. This should be placed on brick-work about a foot high. This space should be filled with about six inches of drainage material, and the remainder with the sand or compost in which the cuttings are to be struck. The frame should be placed in such a position that it can be kept well shaded, and yet at the same time plenty of light admitted. The probable cost of such a structure would not exceed rupees fifty, and could be constructed by any intelligent native carpenter.

STEM CUTTING.

Is the mode more generally adopted to propagate the majority o plants, and a certain amount of discretion is required in the selec tion of wood that is in the proper stage of growth. This varies very considerably. In some classes of plants, only old or well ripened wood can be induced to emit roots, while with others, such as the Geranium, Fuchsia, &c, cuttings strike much more readily when taken from the young growth; or in the case of Crotons, Panax, Arabas, &c., wood in a half-ripened state is better adapted to the purpose. The best material in which to strike cuttings of nearly all hard-wooded plants is pure sand, with a small quantity of finely broken charcoal added. The latter serves the two-fold purpose of maintaining the sand in a sweet condition, and also acts as a stimulant to the cuttings as soon as they emit roots. Soft-wooded plants such as Geraniums, Petunias, Verbenas, Fuchsias, &c., should be struck in a compost of equal portions of leaf-mould and sand. Great care should be taken in removing the plants from the cutting bed that none of the delicate roots are broken, otherwise they will probably damp off as soon as they are potted. After potting cuttings, it is always advisable to place them for a few days under a frame or bell-glass until they have become established. Many varieties of plants root much more freely, if allowed to touch the side of the pot or place in which they are planted. By the following simple method, this is effectually insured, and also a constant supply of moisture afforded to the plants at the same time:—Take two flower-pots the diameter of one, say seven inches, and the other four inches. The larger one should have sufficient broken brick or other material put in it, so that when the smaller one is placed inside, it will remain on a level with the top, the drainage hole of which should be carefully plugged with clay and then filled with water. The space between the two pots should be filled with sand or soil tightly pressed down, and the cuttings planted in it, care being taken that the base of each is placed against the side of the inner pots. No watering will be required as the water contained therein, which should be kept constantly filled, will keep the soil or sand sufficiently moist.

STRIKING CUTTINGS IN WATER.

This is a method that is but very rarely attempted in this country except by way of an interesting experiment, and yet it is extremely simple and at the same time with ordinary care so certainly successful, that it is really surprising that it is not more generally employed. Firminger, in writing on this subject, gives the following rules to be observed:—

I. That the cuttings be the summits of the youngest shoots and in vigorous growth at the time.

II. That capacious bottles be used, so that there is less likelihood of the water becoming foul.

III. That the water be changed often to insure its being quite pure.

IV. That when changed, it be tepid so as to afford in some degree the bottom heat essential for the speedy formation of a callus.

V. That the cuttings be sheltered from wind and sun, but otherwise have all the light and air possible.

VI. That they be removed out of the cold air into the house at night, and if the bottles be plunged half-way up in a tepid bath probably so much the better.

CUTTINGS IN SAND AND WATER.

This ~~is~~ similar to the preceding, but is, on the whole, in our opinion a decided improvement upon it. Great care must, however, be taken to make the sand used as pure as possible This can only be insured by having the sand frequently washed before using it. The following method we have found invariably successful. Take a large seed-pan or *gumlah*, about eight or ten inches deep; carefully plug up the drainage holes and place in it about four inches of sand, and pour in water till it remains about half an inch above the sand. Plant the cuttings therein, and entirely cover the pan with a piece of glass, and place it in a shady position replenishing the water as required. There is no plan equal to this for striking cuttings of Dahlias, shrubby Begonias, and many other soft-wooded plants. Roses also may be successfully propagated by this method, provided young wood of luxuriant growth be selected.

LEAF CUTTINGS.

This is an extremely simple means of multiplying many species of plants, but strange to say it is but little understood or practised in this country, especially as it is quite as easy and as certain in its results as any other method of propagation. The Gloxinia, Hoya Begonia, Cyrtoderia, Peperonia, Fittonia, and many other of our choicest plants can be successfully grown in this way. The *modus operandi* is so extremely simple that, if only ordinary care is bestowed, failure is entirely out of the question. Take the Begonia as an example, and proceed as follows:—Take say a six-inch pot, place about two inches of drainage in it, and fill up with sand, to which has been added a small quantity of charcoal. Take a well-matured leaf, say of Begonia Rex, with about three inches of the leaf stem remaining and fix firmly in the sand; but care must be taken that the latter is quite on a level with the edge of the pot. This will prevent any excess of water remaining on the surface —a thing to be carefully guarded against, otherwise the leaf is liable to damp off. In dry weather they must be placed in a frame or under a bell-glass, but in the rainy season this is not necessary as they will then grow in any shaded position. Treated in this way they will form nice young plants in about six weeks, and if properly cared for, in six months' time they will have formed splendid plants often upwards of a foot in diameter. Some advocate the practice of cutting the leaves up into small pieces, only leaving a portion of a main rib in each. Under favorable circumstances this will answer very well, and a larger number of plants would be secured; but it is not nearly so certain in its results, and besides, the plants take very much longer to form at all, and never make such good specimens as when whole leaves are used.

RUS IN URBE.

Miscellaneous Items.

Nature notices that the successful cultivation, since 1884, of the Ramie or China grass plant (*Boehmeria nivea*) on the Champ-de-l'Air at Lausanne (altitude 520 m) by Prof Schnetzler, is an interesting fact in botany. This shurb, a native of China and Sumatra, has been grown in the south of the United States and of France for thirty years. Recently it had been introduced into Algeria. There is of course a striking difference in the conditions of temperature between Lausanne and the places in Asia where ramie is grown. While the latitude of the latter is from 15° to 35°, that of Lausanne is 46° 31'. The mean temperature at Lausanne is 9° ' 5 C. Last winter the plant underwent long periods of great cold: in one case *e. g.*, the thermometer being below zero for 124 hours, with a minimum on the ground of—12° ·5 C.

THE deleterious action of Cockchafer larvæ on soil and roots is thus described in an article in *Nature*:—"A more extreme case is where the soil becomes damp and clogged with excessive moisture: not only does no oxygen reach the roots, but noxious gases accumulate in solution in the soil, and will hurry matters by poisoning cells which might otherwise live a longer life of usefulness. It is extremely probable that such gases find their way into higher parts of the plant in the air-bubbles known to exist and to undergo alterations of pressure in the vessels of the wood: this being so, they would slowly retard the action of other living cells, and so effect the upper parts of the plant even more rapidly than would otherwise be the case. Damp soil may thus do injury according to its depth and nature; but it need not necessarily be deep to be injurious if much oxygen-consuming substance is present. I have seen excellent soil converted into damp, stinking, deadly stuff from the action and accumulation of the larvæ of cockchafers: those "grubs" may, it is true, accelerate the devastation caused by the consumption of oxygen and the accumulation of poisonous waste matters in the soil by directly cutting off portions of the roots themselves, but the accumulation of Oxygen-consuming substance, and the cutting supplies to the root-hairs evidently plays a chief part in the destruction."

In Alsace and some other parts of Europe, it is customary to specify that only "raft timber" shall be used in constructing buildings, such timber being free from the attacks of dry rot. The raft timber, by the long immersion in water to which it is subjected in floating down the rivers, has the substances which afford food to the dry rot fungus, dissolved out. A French experimenter has found that sawdust, buried in damp soil, rots away in a few years, while sawdust previously soaked in water will remain, if similarly buried, wholly unchanged.

The Melbourne *Leader* writes as follows regarding "London purple" as an insecticide:—Enquiries having been made respecting the codlin moth poison, we republish the following particulars from an American source:—Mr. T. G. Yeomans, speaks from experience in the *Country Gentleman* of London-purple for orchard enemies as better than Paris-green, because it is cheaper, mixes well with water and does not need to be stirred to prevent precipitation. A pound to 100 gallons is a suitable proportion, the poison being first made like paste in a small dish and then added to the tank. He applies it with force pump suction pipe, hose, &c.—costing, all complete 10 dol—one man driving the team and directing the nozzel, while another works the pump vigorously. Thus hundreds of trees may be sprayed in a day; he thinks the best time is about when the blossoms fall, or as soon thereafter as may be covenient, and the effect is very noticeable in improved quality of fruit, due to the destruction "not only of canker worms and codlin moths," but of all other insects injurious to the apple.

Messrs. Burgoyne and Co's. Price current notices that a recent Consular report states that the value of cochineal exported from the Canary Islands during past year was £127,023. It is still the most important staple of exportation and the principal product of the islands. We hear, however, that an attempt is about to be made to cultivate the tea shrub on these islands. With regard to cochineal, in spite of the above results, there has been a general falling off, amounting to something like 10 per cent as compared with the produce of the year 1884, particularly on the Grand Canary, where the crop of cochineal is always more than half the whole yield of the islands. It is asserted that the trade is evidently declining. Nevertheless, the recent rise in price gives some hope that the cultivation of the opuntia for the rearing of the cochineal insect will not be entirely abandoned for many years to come. It is not a little surprising that the discovery of the coal-tar dyes should have injured the cochineal trade; and it would doubtless have ruined it ere this, had it not been found that most of the coal-tar colours are poisons, which cannot be employed with safety in pharmacy or in confectionery. This fact alone ought to cause a revival of the "good old times" as regards cochineal.

An American agricultural paper devotes a good deal of its space to the exposition of what it terms "Sundry humbugs." We take the following from among a number as illustrative of this kind of thing:—"Look out for bogus agricultural papers. It is now just about the time for the annual crop of so-called "Agricultural" newspapers to blossom, mainly at Chicago and St. Louis. These swindling sheets are offered to subscribers for a nominal sum. They steal what little matter they have from respectable agricultural periodicals, and if not issued as a medium for various swindling schemes generally suspend after two or three issues. No periodical is worth having which can be secured for next to nothing. A paper of any reliability must pay for its matter, its printing, its publishing, and all other expenses incidental to the production of a newspaper. When an agricultural, or any other, paper for that matter, is offered at such figures as imply that none of these expenses are involved, then it is safe to conclude, on general principles, that the scheme is a fraud. A newspaper can no more be furnished for nothing than a plough or any other article of value unless it be published for some ulterior purpose, and when this is the case, it not only possesses no value as a newspaper, but is likely to be a decoy designed for the purpose of swindling its readers."

A correspondent, signing himself "C. C. Bell" has addressed the following letter to the *Pharmaceutical Journal* on the subject of "Fireproof Trees":—The "Fireproof Tree," described by Mr. Dyer in the *Gardner's Chronicle*, and referred to in your issue of October 2, would seem to lend some credence to the wonderful tales of Methodius, Nienhoff (quoted by Folkard) and others of similar "vegetable salamanders" growing in various parts of the world. One of these, near the city of Burau, in Natolia, is described as rooted in fire, and yet flourishing in great luxuriance and beauty; whilst another, somewhere in Tartary, even when cut down and thrown into the fire, can neither be ignited nor consumed, for though it becomes glowing red in the flames, yet as soon as they are extinguished the wood is again cold, and precisely the same in appearance as before. You ask, naturally enough, "to what cause this immunity is due?" Is it possible these trees belong to the same order as the one described in Bishop Fleetwood's 'Curiosities of Nature and Art' under the name of *Mesoneidereos*, which grows in Java, has iron wire for pith, and produces a fruit impenetrable by iron? Or perhaps they are related to that equally wonderful plant which Sir John Maundeville saw in the city of Tiberias:—"In that cytee (says he) a man cast an brennyngne dart in wratthe after owre Lord, and the hed smote in to the eerthe, and wex grene, and it growed to a great tree; and yit it growethe, and the bark thereof is like coles." However this may be, we shall have in future to read these old travellers tales somewhat less sceptically than heretofore.

The Editor of the *Tropical Agriculturist*, in publishing the above, appends the following foot note:—The above from the *Pharmaceutical Journal* reminds us of the property of resistence to fire possessed by some of the Indian figs. After "a good burn" which destroyed most of the felled forest on a plantation being opened, we found some gigantic trunks of fig trees at an elevation of about 5,100 feet, not only intact but the bark retaining its natural colour. It was many years before the trees yielded to decay.

Selections.

A PAPER MILL IN THE FLAX FIELD.

Recent advices accompanied by samples of the fibre produced, leave no room to doubt that our ideas as to the production of fibres direct from the green plant, are about to be realised. We have felt, intuitively for years that the future of the papermaker's industry was to be founded upon that base, and so firmly did this idea take hold of us, that we have no doubt many of our readers have, with more or less impatience, turned from the *Gazette's* editorial pages because "the cranky editor is still dinging on the future fibre." We are not yet out of the woods enough to crow very loud, but we are into the edge of the clearing, and the bright light of day is dancing and laughing in our eyes, in such a way as to fill our veins with new life, and a desire to push on and out into the bright sunlight.

As long as two years ago, we began to receive vague hints of a coming machine, which the writers assured us would realise the very idea we had, in a general way, so often outlined. We heard of the machine which was to make a good pulp from the bagasse of the sugar-cane; we heard of numerous plans for utilising various kinds of waste fibre products; but none of these could be traced to the machine itself, until we heard of one which had been invented almost solely in the interest of the jute and ramie growers of the south. Here, we thought, may be our machine. If jute and ramie can be treated so, why not hemp and flax as well? This time we had no difficulty in tracing the report to the machine itself, and there we found a most simple and effectively devised machine—so simple, in fact, that it can be placed in the hands of any intelligent grower and run by him right in the field. What this means in the economies of the world, only an uncertain estimate can be made, based upon the present uses of the plants now grown and the probable widening of the demand by the superiority and cheapness of the new product.

In Kentucky hemp is a valuable crop representing quite a fair proportion of the soil wealth of the State. Yet, owing to the time required and difficulty in its proper preparation for market, there is scarcely as much raised each succeeding year as there was in the previous. For almost precisely the same reason flax is no longer a product of any prominence. But when such machines as the one now being considered can be set up in a neighbourhood—the owners of the patent will set up a machine wherever there are twenty acres or more of jute, ramie, flax or hemp grown—and the plant hauled from the field as fast as cut the greener the better, it puts on an entirely different phase on the entire fibre producing industry. The consumption of this class of fibres is, compared to England and a few other nations, very small, but, even here, an idea of the demand may be taken from the imports of these articles as shown by the Treasury report for the three months ending March 31, 1886; the last column showing the imports for the corresponding period of last year. The figures are interesting, and are food for considerable thought. The table is presented on the next page is just as it is found in the Government report.

The only possible reason that we can see or conceive of why all that three millions of more dollars worth of the raw materials at least, to say nothing of the six millions and more of manufactured goods in these lists, should not be produced here at home except the one of cost. These materials have heretofore been prepared by hand with such low cost, labor that we could afford to pay the duties and transportation on them rather than produce them ourselves. But when the growers who has lands that are not producing as many pounds of cotton as they should, nor can he induce them to yield as many barrels of corn as he ought; when he finds that there is a crop which is easier to raise than hay, at less cost of labor, and which will find its market at his farm gate at a good return, why may he not compete with the cheap labor of those far away lands from which his country draws its supplies?

Now we hear you inquiring, what is all this to papermaking? A little patience please. Of course it is granted by you that

you know of no fibre for paper that can at all compare with flax. At best, all others are but substitutes for the *ne plus ultra.* Wood fibre has been made to do excellently well, and constant improvements will make it still better. It is the best substitute yet found; but still it is a substitute.

NOW WHY DO WE USE WOOD PULP?

There can be but one answer to this, It is because we cannot get rags—or flax—at a price or in quantity to justify their use If we could get rags, or better still, the unbroken fibre of the flax properly cleaned, thoroughly bleached, and ready for the machine as cheaply as we can wood is it reasonable to suppose that we would build any new mills looking to the use of wood pulp? Not any. And scarcely a mill engaged in the manufacture of the better grades but would as quickly as possible discard all th wood pulp apparatus.

WOULD THIS DESTROY THE WOOD PULP INDUSTRY?

We think not On account of its adaptability and the improvements before spoken of, its uses will continue to widen and grow filling an important place in the papermaker's economy, but that place will not be that of prime fibre, If our ideas are any where near the foundation truth of the future pulp question, these machines which take the green plant from the field and so cleanly and rapidly decorticate it, may be used in a similar manner upon the twigs and smaller branches of our forest trees, decorticating them, and thus aiding in the preservation of those immense forests we are now so ruthlessly destroying.

If the economics of manufacture require that the cotton mill should be located in the cotton field, and the pulp mill in the pine lies, why is it not just as important and advantageous to locate the paper mill in the flax field?

For the ten months ending April 30th, '86, our exports of paper (American made) amounted to $940.244, as against $825,619 during the corresponding period of last year. Of this $114,839 was writing paper and envelopes, and $61'105 paper hangings; the remainder unclassified. Now, with the advantages which the new method would give, there is no reason, except wilful neglect to cater for the trade, why these figures should not be multiplied many times over.

ARTICLES	Three months ending March 31— 1886		Three months ending March 31— 1885	
	Quantities.	Values.	Quantities.	Values.
Dutiable.				
Flax, Hemp, Jute, & other vegetable substances and manufactures of—contd.				
Manufactures of flax, hemp, &c.—contd.				
		Dollars.		Dollars.
Brown or bleached linens, ducks, canvas, paddings, cot-bottons, diapers, crash. huckabacks, handkerchiefs and lawns	...	4,150,187	...	3,586 482
Cables and cordage lbs	227 911	20,429	27,880	3,507
Thread, twine, and packed-thread ...	...	175.073	...	176.341
Yarns lbs. ...	5.300.965	204 680	2,879,087	133 938
All other ...	...	816 945	...	875,060
Total ...	...	6,150,465	...	6 075 949
Flax, Hemp, Jute, and other vegetable substances, and Manufactures of:				
Unmanufactured Flax tons	1,520	416,546	1,231	375 320
Hemp, and all substitutes for hemp tons.	10,174	1,301,061	8 800	1,394 760
Jute tons. ...	14,338	382 498	36,763	1,031,650
Sisal-grass & other vegetable substances tons. ...	9,223	595,442	9,251	652,312
Total ...	35,255	2 695,547	56,045	3 454 042
Manufactures of flax hemp, or jute, or of which flax, hemp, or jute shall be the component material of chief value—				
Bags and bagging, and like manufactures ...	...	53,311	...	382,111
Burlaps (except for bagging for cotton)	...	729,840	...	918,105

Southern Trade Gazette.

CULTIVATION OF TOBACCO IN THE NORTH-WEST OF EUROPE.

III.

IN the Netherlands, the land is divided into squares of about one tenth of an acre by means of live fences consisting generally of haricot runner beans. By this means the force of the wind is broken and the warmth of the atmosphere is retained in the enclosures. Mr. de Laune has adopted this plan in his experiment this year, the only difference being that hops are substituted for haricot beans in his case, and the effect upon the temperature in raising that inside the enclosures was very noticeable on the day when I visited the experimental field last August. In the North of France maize is not unfrequently grown round the tobacco plots as live fences for the same purpose.

The date of planting out the seedlings must be regulated by the climate of the locality. There is but one rule to follow, namely to defer planting until after all danger of spring frosts has passed, In the vicinity of Paris, May 10th is said to be the important date; in the south of England, May 22nd has frequently been mentioned, but for a delicate sub-tropical plant like tobacco, probably June 1st would be much safer in England generally. It is, of course very desirable to plant out as early as is practicable after the cessation of spring frosts, so as to be able to harvest before the arrival of the autumn frosts,

After the seedlings have been planted out, they require incessant care, chiefly in judicious watering at their roots, and continuous weeding and stirring the land as well as earthing up, when the plants are sufficiently advanced, Then when the plants have developed the number of leaves agreed upon—from 8 to 12 or more, according to the quality of the tobacco required—the growing point must be pinched off and auxillary shoots must be disbudded as fast as they appear. If the plant should develop a precocious maturity and show terminal flower buds before the proper number of leaves have been formed, the leaves unformed must remain in that condition, and the flower-bud and terminal shoot in their entirety must be pinched off immediately. Except in France, it is usual to allow a certain small number of plants of flower and produce seed for future use. The strongest plants, most true to their kind are selected for this purpose; these are staked and deprived of nearly all their leaves and all side shoots, so as to concentrate the strength of the plant in the seed-capsules. About 10 plants will produce 1lb. of seed, which will be sufficient to provide plants for a large acreage of land. *The seed being so small, it should be mixed with sand to prevent its being distributed too thickly in the seed beds. In France, only those growers* of tobacco who are specially authorized are allowed to produce seed, the Government undertaking to supply the quantities and kinds necessary to enable all growers to fulfil their contracts. The leaves are generally considered fit to be gathered when their fleshy part begins to lose its brilliant green hue and to assume a blotchy yellow tinge between the veins. This alteration in colour is associated with a development of perfume which is very remarkable, and which must attract the attention of even the most unobservant agricultural labourer

There are three methods or harvesting the crop: (1) By picking off the leaves as they become ripe, commencing with the lower ones, and gradually proceeding upwards; (2) By waiting until nearly all the leaves are ripe and then carefully picking them off at one operation, leaving the stem still standing and (3) By cutting the stem about 2 inches from the ground with the leaves still attached It should be added that great care is required when the last method is adopted, in order to prevent injury to the leaves, The first method has already been sufficiently described; it is carried out very carefully in the Netherlands, and in France is done like every other operation connected with the culture and curing of tobacco, under the direction of the Régie, which insists upon the leaves being *cut off* close to the stem. The second method is generally practised in America, and finds favour because it is maintained that the lower leaves, being retained on the stem until the general harvest, prevent the upper leaves from being contaminated with the soil as they form a screen in the event of heavy rains, driving particles of soil upwards. The third system is adopted in parts of Belgium and other districts of Europe were the tobacco harvest coincides with the corn harvest, and where therefore it is difficult to devote a large amount of labour exclusively to the former

Whichever system of harvesting is adopted, one rule is common to all, namely, that the operation should not be attempted in brilliant sunshine, as the effect upon the leaves, after they have been severed from the source of vitality, would be too sudden. On a cloudy day, harvesting may be carried on without let or hindrance, but on a bright day it should be terminated before the sun's rays have acquired their full, strength or should not be commenced until the sun has lost most of its power, say towards four o'clock in the afternoon in the month of September in our climate.

Coming to the details of harvesting and curing,* it may be observed that in France the picking of the leaves at three different times, facilitates their classification afterwards. Thus, supposing a plant has ten leaves, the first harvest would consist of the lower three or four the second of the middle leaves, and the third of the uppermost On a few specially selected farms in the Pas de Calais experiments are being made under the

* It was my intention to give a Glossary of terms and words to those who might wish to study further the French system but a comparison of the Regulations issued to growers in a few of the French departments shewed me that the words used to signify the same thing differed so much in the several departments that such an attempt on the part of a foreigner would be simply misleading to students.

upervision of the officers of the Régie, to test the value of the eaves which grow from the two uppermost auxiliary buds, which f course are not pinched off from these experimental plants. These four additional leaves form a fourth and latest harvest, but he quality of the tobacco which they yield has not yet been ascertained.

The leaves having been cut off close to the stem, or the plant ut off close to the ground, there are several systems adopted to nsure what I call the preliminary drying. In some cases they re left loose on the ground for a time, longer or shorter accord ng to the weather; in others, they are made at once int arlands, as will be presently described, and laid thus upon eac ther; while under the most approved system they are suspende a long garlands from the top of a pole, so as to form a hug unch, which is covered when deemed necessary by a sheaf o traw as a cap. Under each system the object is to get ri radually of the moisture contained in the leaf; and straw i ome shape or another is generally used both to moderate th otion of excessive heat and of too great moisture. When th aves are deemed sufficiently deprived of their succulence, th ext stage in the drying process is resorted to; and I will e eavour to describe briefly its variations as I have observed them n the north west of Europe.

In the French Departments of the Nord and the Pas de Calais, early every farm upon which tobacco is grown, has either an orchard or a special enclosure used for the second stage of the drying process, but the smallest growers are contented with series of pegs under the overhanging eaves of their farm house and out-buildings, from which to hang their garlands of leave Under the old system, the drying enclosure on larger farms is fitted with a series of erections similar to "parallel bars," but much higher. These bars terminate in a shed sufficiently wide to receive at night the whole of the series of cross bars which rest and travel upon the "parallel bars." The cross bars carry a number of garlands of tobacco leaves accoording to the length of the bars, care being taken that there is air space between each leaf, as well as between each garland and its neighbour. The garlands are made by passing a needle and twine through the stalks of from twenty to twenty-five leaves, and thus stringing them loosely and at intervals together—the length of a garland being from 4 to 5 feet The garlands are suspended from the cross bars either by means of a peg, or a hook or a wooden V-shaped twig joint at the end of the string and each garland is furnished with one of these appliances at each end, so that its position may be reversed every day or two, and thus equalize the drying of the individual leaves. At night the cross-bars are pushed backwards under the shed and it requires a considerable amount of practical skill to know exactly to how much sunshine and sun heat the leaves should be exposed, as well as to how much dew and other atmospheric influences, so as to obtain the requisite amount of dryness without brittleness and the best colour possible without the development of mildew.

The more modern system of drying consists in suspending the garlands from iron wires instead of cross-bars; these lines of wire are parallel to each other, and are fitted with straw-thatch roofs in short lengths, so as to be easily removable. These roofs project over the garlands on both sides, and protect them from the dew, thus doing away with the necessity of a shed or hovel at the end of the drying ground. In case of rain, straw hurdles are placed at the side of the garlands, and form a very efficient protection. These straw hurdles abound on every tobacco growing farm, being used for shelter of all kinds, and even as a bed for the man who sleeps on the drying ground as a protection from theft. In every other respect the drying process out of doors is the same as on the other system, but there are slight differences of detail on nearly every farm.

The Belgian system is essentially the same as the French, the principal differences being that the drying places are temporarily straw-hurdle erections, and that the garlands are more generally hung in festoons, suspended at both ends, than vertically from one end. When the whole plants have been harvested as such, the leaves are not separated from the stem until after they have passed through the stage of yellow colour to that of brown, which in no case should be allowed to assume the dark a tint. In the district of Grammont, where this method of harvesting is in vogue, the first drying is, as already described upon the soil itself during the heat of the day, being afterwards completed by the suspension of the entire plants in granaries. Economy in labour and saving of the cost of drying-poles and wires seem to be the chief reasons for this method of procedure.

In the Netherlands, the horticultural method of drying assumes its extreme development, because the leaves are not made into garlands at all. Each leaf has its midrib split to enable it to be strung on a pole or stick, which rests horizontally upon two vertical supports. These structures have somewhat the appearance of a number of towel horses placed parallel to one another; they are small and easily moveable as the tobacco is not allowed to remain so completely in the open air in Holland as in France and Belgium. As I have seen the curing process in the first-named country there is always a drying-shed with vertical louvre-like shutters by means of which the access of the sun, wind, and moisture may easily be regulated.

The third stage in the curing process may now be described. Its chief object is to develop the colour of the lea up a precocious fermentation. Here again there are a variety of methods of procedure, partly adopted by reason of old habit, and partly as the result of recent experiments. The most primitive method is to place the garlands in heaps in the attics of the small farm-houses, which are commonly known as granaries, and to cover each heap with a layer of straw. The next advance upon this method is to place the layer of straw and the layers of the garlands of tobacco in a kind of sandwich fashion; and the third and most approved system is to suspend the garlands of tobacco on wires, while carefully sheltering them on both sides with straw hurdles such as I have already mentioned. Under the first system the heaps require incessant attention, because if fermentation sets in at this stage the quality of the tobacco becomes irretrievably ruined. The slightest rise in temperature therefore necessitates the reconstruction of the heap, by placing outside what were previously the inside garlands. Under both the other systems there is less danger from this cause and specially so under the last named or *vertical* system. The straw absorbs the moisture under the *horizontal* system of layers but currents of air help to carry it off under the *vertical* system.

When this process has been carried sufficiently far, according to the judgment of the grower, he proceeds to the preparation of his crop for market. In Belgium and Holland—countries in which he may sell his tobacco as freely as any other farm-crop, there are no restrictions upon his method of procedure but in France the regulations of the Régie must be rigorously complied with. In practice however there is very little difference in the systems employed, for in all cases the first operation is sorting the leaves into qualities; and the second putting the assorted leaves into bundles of equal quality. It is impossible to describe the process of sorting with a view to guide novices. All one can say is that the qualities sought for are good colour, fine nerves, tough and thin textures of the leaves, with good perfume. As the tobacco leaves ought by this time to have lost at least 60 per cent out of their 88 per cent of moisture, it is obvious that great care is required to achieve this result without setting up fermentation or developing mould while avoiding brittleness. It is to the interest of the farmer himself to classify his leaves to the best of his ability because the merchant always takes off a far larger sum from the price which he would otherwise be willing to pay than the cost to him of a subsequent re-classification.

The next step is putting the leaves in bundles and here again we see how much climate modifies all practices concerning the growth and curing of tobacco. In the Gironde each bundle must contain only 25 leaves namely, 21 stalk to stalk, and one more to be used as a binder or tie; and the principal part of the drying must be done under cover, to prevent the sun's heat converting the tobacco leaves into a mass of powder. Mr. Meadows Taylor mentions 20 leaves as the regulation number in the department of the Lot et Garonne; but in the most northern departments of France (Nord and Pas de Calais) it is 50; and in Belgium and Holland, where people can do as they like, the number rises to 75 and 80. The fact is, that in these northern climates, supposing that the tobacco retains its proper percentage of moisture after drying, there is less reason to fear fermentation during the winter than in the more southern climes, and therefore more leaves may be put together in one bundle without danger. After the bundles are made, they are kept in heaps in the granary and covered over with straw or sacks, sufficiently to enable them to retain their remaining moisture until it is time to deliver them to the Régie in France, or to sell the crop in the ordinary way of commerce in Belgium and the Netherlands. As another example of the differences which the French Government have found it necessary to impose upon the growers of tobacco, I may mention that while in the department of the "Nord" each bundle must be composed of 50 leaves and must be delivered in masses of 50 bundles, in the adjoining department of the "Pas de Calais," although the bundles still contain only 50 leaves, yet each mass must contain 100 bundles.

I have seen a heap of bundles of tobacco-leaves, two years old, in a Belgian barn, covered simply with old sacks; but in France, the Régie gives a fortnight's notice of its requirement for delivery to the magazine of the district. Time has not yet permitted me to investigate what takes place after the tobacco leaves the farmer's hands, except in one case in the north of France. The delivery of the tobacco begins annually in January, and generally continues until March. Upon arrival, the bundles are examined by a committee of experts, who fix the price to be paid to the grower according to the quality of his crop and the fidelity with which he has classified the leaves in the several bundles. Payment is made immediately, and afterwards the bundles are taken possession of by the authorities.

The next process is an official fermentation in large masses of from 10 to 12 tons, as follows:—The tobacco on delivery at the magazine should contain only about 28 per cent of moisture; the bundles are placed in a long series of double rows, leaf tip to leaf-tip, to a height of about 7 feet and a depth of 15 to 20 feet, according to the length of the mass, until the required weight is obtained. Wooden tubes containing thermometers are placed at intervals in the mass, so that the temperature may be observed from time to time. The heat desired is from 100° to 115° F., but if it rises above 120° the whole mass must be taken to pieces and rebuilt elsewhere, each bundle being separately shaken This rebuilding generally has to be done once, and sometimes twice.

When the fermentation is finished the temperature declines to 70° and the quantity of moisture in the leaves to about 20 or 21 per cent After the conclusion of this operation the tobacco is fit to be put into bales, to await the demands of the Government manufactories. The method of proceeding is to line cubical frames of one metre in each dimension with sacking, and to pack into them the tobacco as hard as possible by means of lever presses. The bales of tobacco thus made can be safely kept for some time, but as a rule the product of one year's crop is consumed the next

The possible profit to the English farmer from the cultivation of tobacco can only be guessed at, and the statements on the subject derived from Continental sources are widely divergent As an example I will contrast the account given in the English newspaper *Agriculture*, of April 14 (derived from a Belgian source), with the statement furnished by the Agricultural Society of East Flanders to the Belgian superior council of agriculture only premising that the latter account comprises the actual figures taken from the Canton of Grammont, which is admittedly one of the best tobacco-growing districts in Belgium.

	Agriculture, April 14th, 1886. fr.	£	Official Reports, 1878. fr.	£	s.	d.
Manures	1,000 =	40	... 1,536 =	61	8	9
Labour	1,000 =	40	... 601 =	20	0	9
Tobacco-tax	800 =	32				
Rents, rates, and taxes ...	300 =	12	... 261 =	10	8	9
	3,100 =	£124	... 2,398 =	£95	18	3

It should be observed that the Government tax is not included in the Official Report, but I do not propose to vary in any respect either statement. I now come to the returns, which are reported on page 755.

According to the unofficial statement, which is in round numbers the profit of a hectare of land in tobacco is £38, or rather over £15, per acre, but according to the official statement, the profit is only 9*l*. 7*s*. 3*d*. per hectare, or about 3*l*. 15*s*. per acre. It is quite obvious that the former calculation is a mere theory, more especially with regard to the price obtained for the tobacco, which rarely amounts to more than two-thirds of the sum mentioned in the calculation quoted by *Agriculture*.

	Agriculture April 14th, 1886. fr.	£	Official Report, 1878.	fr.	£	s.	d.
2,100 kilos, 1st quality, at 1 fr. 50. c. per kilo	3,150 =	126	28,000 kilos.	2,632 =	105	5	6
900 kilos, 2nd and 3rd qualities, at 1 fr. the kilo	900* =	36					
	4050 =	162					

M. Letixerant, chief inspector and engineer of the French tobacco department, gives, the following account † of the expenses of a hectare of land planted with tobacco at Nijkerk in the Netherlands :—

	florins.	francs.	£	s.	d
Manures ...	400 =	840 =	32	12	0
Labour ...	250 =	525 =	21	0	0
Seed and plants	30 =	63 =	2	10	5
	680	1,428	£57	2	5

These items are irrespective of any charge for rent of land, or of buildings, or for excise or interest upon capital employed. The same authority gives the gross proceeds as 900 florins, giving a nominal balance of 220 florins, or about 18*l*. 10*s* per hectare, or 7*l*. 8*s*. per acre to cover all the other outgoings. As M Letixerant observes, considering the rent value of the land ; and the necessary buildings, and the fair interest upon the capital employed and the excise, the only way in which profit can be obtained by the cultivation of tobacco is by the grower and his family doing the work themselves.

Many other statements of account might be given, but without definite information as to the district and the rate of wages which prevail there, such calculations are misleading instead of being instructive. For instance, in a Belgian standard work on tobacco ‡ a calculation for the French department "du Nord" is given showing a profit of only 103 fr. 55 c. per hectare, or about 32*s*. per acre, and another calculation from an unmentioned department of France showing a net profit of 1,299 fr. 60 c. per hectare, or nearly 21*l*. per acre. These calculations are mere theories, and I can only repeat that the single exception to which I can refer is the official statement to the Belgian Superior Council of Agriculture which I have already quoted.

I quite agree with the conclusion arrived at by M. Demoor, after considering his array of Profit and Loss Accounts, that if tobacco does yield a considerable return in good years, on the other hand we must not forget that in unfavourable and stormy years the crop is worth very little. In illustration of this I may state that this autumn I visited a farmer in the north of France, whose crop of tobacco had been rendered practically worthless by a hailstorm which occurred in the third week of August : but the Régie insisted upon the crop being cured and delivered, although at the time of my visit it consisted of little more than the ribs of the leaves. Fortunately my friend's crops had been insured against hailstorms. On the whole, however, this year has been very favourable to growers of tobacco, in the districts which I have visited ; but last year was precisely the reverse.

One final word of encouragement to English growers may be gathered from the experiments of M. Biot, the results of which I have already indicated. It is well known that a September hoar frost is absolutely fatal to the tobacco crop. The great expenses of labour, manure, rent rates, taxes, duty, &c., incurred for the purpose of a tobacco crop, may be absolutely lost in consequence of a frosty night at the time when the tobacco is becoming fit to be harvested. But M. Biot tells us that the best tobacco is that which is harvested before it comes to maturity. If this should prove to be the case in our climate, there is more chance of tobacco being successfully grown in England than I ever anticipated, although, as I have tried to make it clear, the profit to the grower under this system is not so great, even on the Continent as upon the old plan of harvesting the tobacco as it arrives at maturity. M. Biot's experiments have only recently been published, and his conclusions are eminently worthy of being put to the test by English pioneers in this new effort to grow tobacco in the United Kingdom.

TABLE I.—STATISTICS relating to the GROWTH of TOBACCO in the DEPARTMENT DU NORD.

YEARS.	Number of Cultivators.	Number of hectares cultivated.	Quantity of Tobacco demanded. kilos.	Quantities paid for. kilos.	Amount paid. francs.	centimes.	Average price per 100 kilos. francs.	centimes.
1863 ...	1,600	914	2,800,000	2,567,521	2,279,065	30	88	77
1864 ...	1,644	918	2,800,000	1,984,176	1,645,157	80	82	91
1865 ...	1,384	808	2,800,000	2,513,978	2,095,625	00	83	35
1866 ...	1,310	770	2,800,000	2,110,441	1,701,119	90	80	60
1867 ...	1,068	603	2,800,000	1,714,479	1,525,722	20	88	98
1868 ...	1,014	564	2,800,000	1,460,177	1,301,780	40	89	15
1869 ...	961	537	2,800,000	1,216,149	1,026,109	60	84	37
1870 ...	896	473	2,500,000	1,256,397	1,053 360	40	83	83
1871 ...	696	365	2,500,000	907,947	807,054	90	88	88
1872 ...	852	424	2,500,000	1,146,164	1,035 811	30	90	37
Total ...	11,325	6,377	27,100,000	16,877,429	14,470,806	80		
Average ...	11,32·5	6,37·7	2,710,000	1,687,742 9	1,447,080	68	85	74
1882 ...	726	466	2,520,000	1,315,240	1,153,146	60	88	05

TABLE II.—STATISTICS relating to the GROWTH of TOBACCO in the DEPARTMENT DU PAS DE CALAIS.

YEAR	Number of cultivators.	Number of hectares cultivated.	Quantity of Tobacco demanded. kilos.	Quantities paid for. kilos.	Amount paid. francs.	centimes.	Average price per 100 kilos. francs.	centimes.
1863 ...	2,690	574	1,800,000	1,145,255	950,745	20	83	01
1864 ...	2,793	610	1,500,000	896,371	719,211	60	80	23
1865 ...	2,668	669	1,200,000	1,221,878	998,867	70	81	74
1866 ...	2,758	601	1,200 000	1,015,576	701,343	20	69	05
1867 ...	2,560	537	1,200,000	924,702	741,617	00	80	20
1868 ...	2,368	505	1,200,000	1,053,754	882,394	80	83	73
1869 ...	2,248	492	1,200,000	864,168	658 994	80	76	02
1870 ...	2,247	478	1,200,000	946,523	757,896	00	80	07
1871 ...	2,233	460	1,200,000	853,254	666,947	10	78	16
1872 ...	2,399	505	1,300,000	1,071,696	894 510	30	83	46
Total ...	24,962	5 331	13,000,000	9,993,175	7,970,527	60		
Average ...	2 496·2	533 1	1,300 000	999,317 5	797 052	76	79	75
1882 ...	3,598	824	1,800,000	1 340,755	1,216 999	44	90	76

* In the original this amount figures as 1,350 francs or 900 kilos at 1 fr. 50 c. being the same price as for the first quality although it is stated to be at 1fr. the kilo. This mistake vitiates the conclusions drawn from the calculation in the newspaper referred to.

† 'Memorial des Manufactures de l'Etat' Tabacs. Tome premier. Deux[illegible] p 132.

‡ V. Demoor ; 'Du Tabac' Paris ; Auguste Goin.

BRICK TEA FOR THIBET.

The question of the manufacture of brick-tea for the Thibetan market requires looking at from other points of view than the one of the necessary machinery for making it. The article by "Peripatetic Planter" in our last issue clearly points out the difference between compressed tea as turned out by existing machinery, which is suitable for the Russian market, the colonies and the marine—and brick tea suitable for the Thibetan market. He notes that to make brick tea for Thibet will require a special press, and thinks there is a great future for Indian planters in the manufacture of the brick tea. As he says, the machinery for the manufacture of brick tea will be somewhat costly, and it would be a pity to find that money was being wasted by a start made in the wrong direction. It should therefore be considered whether the Thibetan market for brick tea is so easily accessible as to make it worth the planter's while to undertake the cost of special machinery to make it. There is no question that brick tea is largely consumed in Thibet, but it is very doubtful whether the supply of the article is not already over the demand; and there is a still greater doubt as to whether granting that there is still a demand in excess of supply for brick tea in Thibet—the Indian tea planter is in a position to meet it. The struggle to produce a good and yet cheap tea which can compete with, or oust China from the well established home and colonial markets is yearly becoming keener. As long as Indian teas commanded high prices, and were purchased chiefly by dealers to mix with Chinas, without much being known about them by the consumer, more money could be spent on the gardens than is possible now, and a little extra machinery for fancy experiments, would have been of less importance than at present. Now that Indian teas are being placed on the market in large quantities are becoming known directly to the consumer and have to meet Chinas at low prices on their own merits, every rupee of expenditure has to be carefully looked to; and the whole time of managers and assistants may be usefully employed on the preparations for and the manufacture and despatch of their ordinary crop for the ordinary markets. True, brick tea is to be made from prunings, apparently, and the manufacture would not be commenced till the ordinary manufacture of the usual leaf teas had ceased, and profit may fairly be assumed to accrue from the manufacture and sale of prunings which are at present merely wasted, burnt up, or hoed into the ground as manure. But, granting that the Indian planter can turn his prunings into brick tea, without interferring with the outturn, quality or cost of his ordinary crop; and granting further, which is no inconsiderable concession, that the bricks so made would be of the particular quality approved of in Thibet, is it at all certain—is it even probable, that a ready sale would be obtained for them? The bulk of the Indian tea districts, from Kangra on the west, through Dehra Doon, Kumaon, the Terai, Darjeeling, Western and Eastern Dooars to Luckhimpore on the east lie on or immediately at the foot of the Himalayas; and from Kumaon eastwards run parallel with and are separated from Thibet only by the Himalayas themselves. Kangra and Dehra Doon already have a certain trans frontier market in Afghanistan, Cashmere, Ladakh and perhaps Busahir and the extreme west of Thibet about the Rudokh district. Some years ago, Cashmeree and Kabulie tea merchants used to call at the factories in Dehra Doon, buy the green teas in bulk, pack them in their own sacks and cart them off themselves. There was a decline in this trade for a time, during the frontier troubles of the last few years, but we understand that this market for green teas has revived again of late. There was evidently no demand for brick teas here, otherwise the Kangra Valley and Dehra Doon planters being in touch with the trans-frontier markets through the Cabulee merchants would have started supplying it long ago.

From Kumaon, eastwards to Assam there are some seven well-known trade routes, across the Himalayan passes into Thibet. Through Garhwal and Kumaon there are five principal passes leading into Hundes, over which a certain amount of traffic is carried for about four or five months in each year, *i. e.*, from June when the passes are generally declared open by the Lhassan authorities, to October when the snow shuts them up. The imports into India are chiefly gold in small quantities, pashm or shawl-wool, sheeps-wool, salt, borax, goats, and ponies. From India the chief exports are grain of sorts—wheat, barley, and rice,—goor (coarse sugar) and spices. Broadcloth of the cheaper kinds,cotton goods and indigo are in considerable demand at Shigatze and Lhassa; and a little trade is done in precious stones, turquoise, rubies, pearls, and coral, Through Nepal there are of course no present facilities for free trade with Thibet, nor are there any tea districts to the south of Nepal which could utilize any outlet through it for their produce. Darjeeling, the Terai, and the Western Duars might utilize the route through Sikkim over the Jelepla. Assam's only available line of communication at present with Thibet is from Udalguri through Tawang. This is perhaps the shortest and most direct route of any from the tea districts to Lhassa, but would probably be found the most impracticable for the introduction of brick tea nevertheless.

With the foregoing existing trade routes open into Thibet, it might be assumed that it would be easy to export the brick-tea, when made across the Himalayas and place it on the Thibetan market. But the most serious difficulty in the way of opening a market for Indian brick tea, or Indian tea of any description, in Thibet, is to be looked for in the determined opposition of the Chinese authorities at Lhassa, and the officials generally throughout Hundes and Chang, the divisions of Thibet which more immediately adjoin the Himalayan watershed. The Thibetans generally are very fond of tea; and drink it in considerably quantities. They make first a very strong decoction of brick or leaf tea; put a cup full of this into a pot of boiling water, add a lump of butter or ghee, then churn up the mixture thoroughly before drinking sometimes adding a little soda. Brick tea is in general use, though good leaf tea may be procured sometimes at Gartokh at prices ranging from Rs. 1 to 8 per lb. according to quality. The tea comes through Lhassa only, and the sale of it is a strictly Government monopoly. The Lhassan authorities are extremely jealous regarding the introduction of Indian tea; and the Hunias and Thibetans generally have a prejudice against Indian tea, which is of course carefully fostered by the officials. A heavy fine is imposed on any found trading in Indian teas, but occasionally the Bhootias from our side of the passes manage to smuggle small quantities across and dispose of it to the poorer classes of the nomadic tribes who herd cattle on the uplands near the watershed during the summer months. The brick tea in general use weighs about 8 lbs, and is sold for about a rupee a lb.—a sum considerably above its real value. The sale is forced in a peculiar way. The Lhassan Government issues a certain quantity of tea to the Jongpan or Governor of each district in the various provinces, for which tea he has to remit a certain fixed sum yearly in addition to the ordinary revenues of his district. His own salary and that of his subordinate officers is paid in tea. The Jongpan in his turn issues the tea to the people of his district in quantities according to the wealth and standing of each family; whether they require it or not, they have to take it; and of course, fixing the price himself for the year, he takes good care to leave himself a good margin for personal profit over and above the amount he has to remit to Lhassa. Almost every family is obliged to take some tea only the very poorest, from whom payment in cash cannot be squeezed, being exempt. The profit made by this monopoly is of course, a most cogent reason for the official prejudice against the introduction of Indian teas, and accounts for the severity of the rules against introducing it, and for heavy fines levied on any one found trafficking in it.

With these facts in view, it is somewhat questionable whether there really is any practically accessible market for brick tea open in Thibet, and it would be as well to thoroughly ascertain that there is such a market where Indian brick tea might meet and compete on fair, terms, with China bricks, before incurring the expense of machinery. It is all very well to utilize a product of the tea bush at present declared to be wasted, but if the manufactured result is unsaleable for want of a market, is it any, the less a waste?—*Indian Planters Gazette.*

NURSERIES FOR RUBBER (*FICUS ELASTICA*).

Seed beds should be prepared where the soil is neither too moist nor too dry. The ground should be well hoed to the depth of 2 feet, and the earth exposed to the sun for a day or two, and then hoed again. When the soil is soft, raised beds should be prepared a good foot above the ordinary level. The beds at the Charduar plantation in Durrang were, if rightly remembered, 40 feet by 3 feet.

Charcoal should then be powdered finely and mixed with the upper portion of the soil. The whole of the upper surface of the bed should be fenced in by reeds, sufficiently high to keep the earth from falling away and carrying seed with it, when being watered, &c.

The next step is to build a shade over the beds. The shade should be sloping, being 6½ feet high on one side and 4½ feet on the other, the higher side facing the north, for the length of the beds should run east and west. This shade should be light and is easily constructed, the posts being first fixed with a few purlins,and then light frames of thatching grass tied firmly on to them. Great care must be taken that this roof does not leak, and that the beds are far enough apart to ensure the drip from neighbouring roofs against falling into them.

It is now time to sow the seed. This should never be done with the whole fruit, which should be broken between the hands and pressed frequently through a fine sieve. It should then be thrown broadcast over the prepared beds, with an extremely light covering of earth. About five seers of seed (not broken) are necessary for beds 40 feet by 3 feet. The best time to sow is early in April, though the seed will germinate no matter when sown. It was observed that seedlings were stronger and germination more profuse from April's sowings.

The beds should then be lightly watered for the first few days, but not afterwards till germination, unless it is exceptionally dry After germination, light watering is necessary, which is increased as the seedlings grow stronger.

When the seedlings begin to look strong, the shade should be removed, but very gradually indeed, or the young seedlings will be scorched. The shades should be moveable so that they may be replaced during the hottest portion of the day.

On attaining a height of two inches, the seedlings are fit for pricking out into beds which should be specially prepared for them, but not raised. These beds are 2 feet wide, and seedlings are pricked out 18 inches apart in a double row, at the Charduar plantation.

The transplanting beds must be kept very clear of jungle till the seedlings are strong enough to keep it down. They require no other care, except that in planting them out again on their final resting places, the root should not be injured. Planting out on mounds is advisable; just when the rains commence or are about to close being the best time.

Before germination of seed and immediately after it, moss used to grow on the seed-beds and do grave damage at Charduar, and this was only removed by deep hoeing in the first instance. Innumerable grubs also did immense harm subsequent to germination, and here the removal of shades and watering with tobacco mixture, &c., was beneficial.—*Jungli in Indian Forester.*

A NEW SUGAR-CANE.

(*From Food.*)

For some years, remarks a well informed writer, efforts have been made to bring together into one collection all the different varieties of sugar canes which are known under cultivation in the sugar-producing countries of the world. It would appear now that this object has in a great measure been accomplished in the extensive collections of sugar-canes under experimental cultivation by the department of public gardens and plantations in Jamaica. The collection, as a whole, embraces about eighty varieties of canes, and it has been pronounced by a competent authority connected with the department of Agriculture, Washington, "as probably the best collection of sugar-canes ever gotten together."

As indicating the wide area from whence these canes have been obtained, it may be mentioned that the "elephant" cane, so called from the size it attains under favourable circumstances was obtained from Saigon, Cochin China; the Salangore cane is a native of the Malay peninsula where it is highly esteemed. The Tiboo cane is also East Indian, and is a productive cane of great merit. From Mauritius there come the Horne, the Mauritius and the Barkley canes. From Queensland there are the Brisbane, the Green-Rose Ribbon, the Queensland, and the Hillii; while from the Pacific Islands (probably the home of the sugar-can) there are the Lahaina, the Cuban, the Pua-olo, and the Ko Kea. The Lahaina cane is described in Hawaii (Sandwhich Islands) as being the most universally esteemed of all canes, and everywhere, excepting at great elevations, it is planted to the almost total exclusion of other varieties. This cane has yielded as much as an average of 6 tons of sugar per acre on areas as extensive as 100 acres, and 7½ tons per acre on an average over areas of 20 acres.

The Pua ole cane, another great favourite in Hawaii, is called the flowerless cane because it never tassels, or throws out a flowering shoot. It is described as a soft, rich cane, yielding juice of high specific gravity, and especially adapted for cultivation at high altitudes. The Cuban, or Ko-Paka, in Hawaii, comes next to the Lahaina. It is rich in juice, rattoons well, grows rapidly and is entirely free from "cane itch."

The Samuri cane is the favourite cane with the sugar-planters of Fiji. It is hardy, grows rapidly, and yields sugar freely. Of dark-rind canes, such as violet, purple, and black, there are numerous varieties. Many of these, such as these Egyptian and the Martinique, are admirably adapted for dry, arid regions, and grow luxuriantly where other canes would fail. Others, again, are adapted only as fodder plants, and are often grown for that purpose when grass is scarce. The Mamuri cane, of a dusky brown colour, is certainly a strange looking cane. It would appear to be covered with a thin, dry bark, which marks it at once as a distinct and specialised variety. This is a hardy, slender cane, which would grow in the driest situations. Of striped canes there are very handsome specimens, such as the Green-Rose Ribbon and the Red Ribbon, which attract attention, and are likely to be great favourites with planters.

In the West Indies generally the favourite canes are the Otahhite, the transparent, Mont Blanc, and the Bourbon. These may be said to yield the bulk of Cuban and West Indian sugars, but several others are being tried, with the view of testing their capabilities for different soils and climate. As the sugar-cane has lost the power of producing seed from which plants may be raised, it is now entirely propagated by shoots or pieces of the stem, which are furnished with eyes at every joint. These eyes give rise to new plants, which necessarily must be identical with the parent plant, and keep true for an indefinite period. The importance of introducing new canes, and so testing the highest producing powers of the land, in these days of low prices and keen competition, is self-evident.

From the supplement to the *Jamaica Gazette* we find that the collection of canes above-mentioned sent to the New Orleans Exposition has lately been carefully tested by Dr. Crampton chemist, attached to the Bureau of chemistry department, Washington, D. C. Planters in the West Indies would do well to procure these analyses, and carefully consider whether some of these new canes do not offer them advantages in a cultural and economic sense superior to the old. We may add that a full description of these canes was given in the last report of the Director of the Botanical department, Jamaica, and Dr. Crampton's analyses are intended to supplement those descriptions, and give sugar planters every possible information on the subject.

SOURCES OF NITROGEN AS PLANT FOOD.

A CORRESPONDENT ("P. T. I.") in asking the following questions opens up a wide and an important enquiry :—

1. Nitrate of ammonia being the chief compound from which the roots of plants absorb nitrogen, is the greater amount of it formed in the air (and carried to the earth by rain) or in the earth?

2. In reference to the nitrate of ammonia formed in the soil, how is its nitric acid formed, and how is its ammonia formed? Is its ammonia chiefly produced by the decay of organic substances, or absorbed from the air, or brought down by rain?

3. Do the roots of plants absorb ammonia uncombined with any other substances, but merely dissolved in water?

4. Do the roots of plants absorb sulphates, carbonates, and phosphates of ammonia in a state of Nature?

5. Is ammonia, uncombined with any other substances, brought down to the earth by rain?

6. In reference to the ammonia present in the soil, is the chief amount of it (*a*) brought down to the earth by rain, (*b*) absorbed from the air by the soil, or (*c*) produced by the decay of organic substances in the soil? Plants obtain the elements of which they are built up partly from the atmosphere and partly from the soil. The water and most of the organic matter, making on an average from 90 to 95 per cent of the total weight of the plant, comes from the atmosphere, either directly through the leaves or indirectly from the soil by rain, and then to the plant through its roots.

Nitrogen exists in soils in three combinations—with carbon, with hydrogen and with oxygen. When in combination with carbon it is very insoluble in water, and it is in this from that we find by far the greater part of the nitrogen that exists in soils.

This nitrogenous organic matter of the soil has been derived either entirely from the decay of vegetable *debris* left in the land by preceding generations of plants, or possibly to some extent from past applications of farmyard or of other organic manures. It is also a fact that besides the residues of crops soils received certain amounts of nitrogen from the atmosphere in the form of ammonia and nitric acid, but the quantity of these substances contributed annually by rain varies in different years and places. The averge of many experiments on the Continent gives 10·23lb. of nitrogen per acre. The average of some English experiments is but 7·29 lb.

Rain also furnishes small quantities of alkaline chlorides, especially in the neighbourhood of the sea, and about 18lb. per acre per annum of sulphuric acid.

Although the amount of ammonia directly absorbed by the soil from the atmosphere may in some soils, be much larger than is shown by the analysis of the rain, yet the total nitrogen acquired, though most important as tending to counterbalance the losses of plant food which the soil annually suffers, will have little effect on the present fertility in comparison with the large accumulation of nitrogenous matter resulting from previous crop residues, and decay of animal refuse.

In all kinds of soils there exist very minute underground organisms, called "bacteria," invisible to the eye, the function of which is to separate the carbon and hydrogen from the nitrogen, and to unite it with oxygen. But to effect this lime must be present in the soil, and the compound so formed is called nitrate of lime.

Nitrogen in combination with hydrogen forms ammonia, and the substance with which most gardeners are acquainted as amomnia-salts is obtained from an extinct vegtation.

Nitrogen in combination with oxygen forms nitric acid, these combine under the influence of the electric discharges in the atmosphere, nitrous acid being formed; this is converted into nitric acid by the action of ozone, or peroxide of hydrogen, and is brought down by rain.

Ammonia cannot exist as such for any length of time in the soil, neither is it taken up by plants in that form.

The facility with which ammonia and other nitrogenous substances are converted into nitric acid by the oxygen of the soil is so great, that nitrates become by far the most important source of plant-food.

The uncombined nitrogen of the atmosphere is not appropriated by plants.

Plants roots take up all the diffusible substances which are present in the water which they draw from the soil; but the feeding power of roots is by no means confined to the taking up of ready formed solutions, for they are also capable of attacking some of the solid ingredients of the soil which they render soluble and then appropriate, for the building up of their vegetable fabric. The best of all manurial applications are those which supply both phosphates and ammonia or nitrogen. —*Gardeners' Chronicle.*

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VOL. XII.] CALCUTTA :—SATURDAY, JANUARY 15, 1887. [No. 3.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 5TH JANUARY 1887.]

Madras —General prospects good.

Bombay.—Standing crops generally in good condition everywhere, but in parts of nine districts slight damage was done by blight, cloudy weather, and insects. Fever in parts of eleven, cattle disease in parts of eight, and small-pox in parts of three districts.

Bengal—No rain reported during the week, except a light shower at Serajgunge. Harvesting of rice is being rapidly completed with good out-turn. Prospects of *rabi* crops and poppy continue to be generally favourable, but in Gya and Shahabad poppy has been slightly injured by recent cloudy weather. Transplanting of *boro* paddy is in progress Fever and cholera have much abated, and the general health is fair.

N.-W. P. and Oudh.—Slight showers in some districts which have benefited crops. More rain wanted. Cloudy weather has injured *sarson* crop in two districts Prospects of *rabi* and poppy continue favourable. Markets well supplied, and prices generally steady. Public health good.

Punjab.—Rain has fallen in Delhi, Sealkote, and Rawul Pindee districts; wanted in Umballa, Ferozepore, Sealkote, Lahore and Peshawur districts. Small-pox decreasing in Peshawur, elsewhere health good. Foot-and mouth disease has appeared among cattle in tehsil Shahpore, and small-pox among sheep in tehsil Khushab. Prices rising in Umballa, Ferozepore, Lahore and Rawul Pindee districts, fluctuating in Delhi, stationary elsewhere. *Rabi* progressing.

Central Provinces—Weather rather cloudy, and is likely to damage the *rabi* crops. Threshing of *kharif* still continues. Fever and cholera in places. Prices steady

Burmah.—A few cases of cholera in Akyab, Rangoon, Thongwa and Tharrawaddy, and fever in Kyaukpyu. Cattle everywhere healthy. Harvest nearly completed in six districts, and progressing satisfactorily elsewhere.

Assam.—Weather seasonable. Slight rain during the week Reaping of *rabi* nearly finished. Reaping of *sali* crops finished. Reaping of *amun* will shortly be finished. Crushing of sugarcane in progress. Prospects favourable. Public health fair. Prices steady.

Mysore and Coorg.—No rain during the week. Crops in good condition. Reaping of rice crop commenced. Season and crop prospects favourable. Public health good. Prices stationary.

Berar and Hyderabad.—No rain during the week. Weather clear and cool. Cotton-picking and *kharif* harvesting nearly completed. *Rabi* crops in good condition. *Jowari* thriving. Sowing of *rabi* crops in progress. Fever and ague mitigated to some extent. Prices steady.

Central India States—Weather warm and cloudy in places, otherwise clear and cold. Health and prospects good. *Rabi* prospects excellent. Prices stationary.

Rajpootana.—Weather seasonable, cloudy in some places. Very slight rain in Ajmere and Bikanir. Tanks and wells low and drying in many places. Crops progressing favourably, except in Kerowlee, where, for the want of rain, they are suffering, and in Beawur, where they have been slightly injured by frost. *Rabi* all sown and doing well. Weeding in progress. Public health good, except in Kerowlee, where small-pox is very prevalent among children. Prices generally steady.

Nepal.—Prospects fair. Prices still high.

Editorial Notes.

WE publish this week a paper of much interest on "The Principles of Land Assessment." It is written by a gentleman who thoroughly understands the subject. The proposal to organise and carry out a "survey of climates," is as novel as it is important, and we commend the paper to the consideration of the Government of India.

* * *

WE gather from the report on the river-borne traffic of Assam for the last year, that large demands have been made on the Makum coal-fields for their produce. It is further stated that these mines now supply all the coal required by the increasing steamer and railway traffic of the province, a statement which holds out every hope that the Makum coal has a future before it.

* * *

THE estimated area under wheat this year in the Punjab is 6,857,000 acres, or two per cent less than last year. Rain fell in October only in the districts near the hills, and in most other districts the sowings are short It is upon these late rains particularly that both the winter rice crop and the *rubbee* or spring wheat harvest depend. The rains are indispensable at this period for filling the ear of the rice crop and preparing the soil for the wheat sowings.

* * *

IN another column we reproduce this week a very interesting account of the proceedings of a meeting of the Pharmaceutical Society of Great Britain, on which occasion *Dr. Aitchison*, who accompanied the Afghan Boundary Commission as naturalist and botanist, not only addressed the meeting, but read a note on some plants and plant products of Afghanistan. It will be seen that the learned doctor has set at rest some of the doubts that existed as to the origin of some of the gum resins of that region which find their way to India and other countries.

* * *

OUR newly started contemporary, *Indian Engineering*, in its issue of the 8th instant, has some interesting notes and comments. Among other matters we are told that the country between Kussowlie and Simla is said to be rich in silver, lead and copper, but there being no convenient supply of fuel at hand, it has hitherto not been found possible to work these metals profitably. But coal has now been found near enough to become available should the long-projected railway scheme be carried out; while its abundance and quality indicate that the financial argument against the railway is not only visionary, but an obstacle to the development of the resources of a district which, though rich in mineral wealth, is now lying fallow for the want of energy and capital to work it.

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THE artesian well at Agra has turned out a failure. *Indian Engineering* informs us that the "boring operations having been continued by the municipality for some time after geological experts had declared all chance of reaching a water-bearing stratum had ceased, was finally ordered to be abandoned, and the operation of drawing the pipes is now in hand. The failure, so far, of the experiment is to be regretted ; but there seems no reasons why a further trial should not be made in a more favorable locality and with improved apparatus. The Lucknow water-supply must ere long be seriously con-

sidered, and in view of the enormous advantages that would accrue to the whole of the province, should an artesian well boring turn out to be feasible, there seems every reason for not allowing the experiment to fall to the ground on account of the failure at Agra."

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The same paper is informed that the Port Canning and Land Improvement Company purpose improving their property at the Mutlah *embouchure* by sinking an artesian well with the view of obtaining *fresh* water. We believe that it is the intention of the Company to bore to the depth of 250 feet in the first instance. This, we think, is all that will be necessary, for the results of the Fort William boring show that "there are no springs but of salt water likely to be met with in the vicinity of Calcutta within 70 or 80 feet of the surface;" and it was further shown that "there are fresh water springs at a depth not exceeding 130 feet, and that their source is of sufficient height to allow them to rise to within 4 or 5 feet of the source of the most elevated lands on the banks of the Hooghly."

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Last week we referred to the action about to be taken by the Dutch Minister for the East Indies for the relief of the sugar industry in Java. The *Standard* publishes the following telegram from The Hague, on this subject :—The second Chamber of the State General held a sitting last night, at which a final decision was taken upon the Ministerial proposals for the relief of the sugar industry in Java. It was resolved that the tax on free cultivation should be temporarily remitted, and that a delay of five years should be granted in respect of one-half of the payments due by the manufacturers having contracts with the Government. It was also decided that the export duty on Java sugar should be remitted for five years

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Some time ago we had occasion to notice the question of the right of Government to fishery in navigable rivers. A circular order has now been issued by the Bengal Board of Revenue on this subject, in which it is is announced that the Government has the right of fishery in all navigable rivers which are public property, unless the right has been granted or leased to some individual. In regard, however, to tidal rivers, it may sometimes be expedient that the exclusive right of fishery should not be granted to private individuals or to certain classes of individuals to the exclusion of the general public, and no lease of such a fishery is to be granted without the sanction of the Board.

Last Wednesday's *Calcutta Gazette* contains the Resolution by the Lieutenant-Governor on the report of the Agricultural Department of Bengal for 1886, which we are unable for want of space to review at length this week. We note, however, with satisfaction that the rumour current as to the abolition of the department was without foundation, as Sir Rivers Thompson observes that although this department was created and sanctioned for a limited period only, he "never doubted that its work would be such as to demonstrate the necessity for retaining it as an essential part of the permanent administrative system of Bengal." We congratulate the local Government upon this decision, and hope to refer at length next week to the work of the department.

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The Punjab Land Bills now upon the anvil of the Supreme Legislative Council meet with by no means unanimous approval, we are told, from the interests chiefly affected by them in the Punjab. The opposition to the Oudh Bill is from certain causes intensified with regard to a similar measure for the Punjab. Nor is this hostility diminished we fear by the complaint made against the Punjab Government of attempting to rush the Bills through without proper investigation. "The Punjab Chief Court, for instance, complained that the Secretariat had submitted one of the Bills too late for the court to consult the land-owners affected and they refused, therefore, to send in their opinion by the date originally fixed. Delay and inconvenience have been caused; but it is better so, than that natives of the Punjab should have cause to complain that laws seriously affecting their welfare, had been rushed on to the statute book without allowing them time to protest."

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The committee on forage at Aldershot camp has been making experimental trials with various kinds of forage for use on active service, and having concluded its investigations, has sent in a report to the millitary authorities. The horses of several troops of the 1st Royal Dragoons were fed for some months on different kinds of forage, and were weighed at intervals during the period of trial. Hay cake, grain cake, kiln dried oats, oat-cake, Good's compressed forage, and the ordinary service ration were all tried, and it was found that the horses throve better on Good's forage than any other. The ration is 20lbs. The next best forage appeared to be a mixed ration of 20lbs., (40 per cent cake, 52 per cent oats, and 8 per cent bran) while the service ration was the worst tried. An additional advantage claimed for Good's ration is that the bales of forage are not only very portable, but have been found to be bullet proof, and admirably adaptable for hasty defences in the field.

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Grass-farming is now assuming an importance in this country hitherto unknown. But unfortunately the laying down of land to grass is generally carried out in a haphazard kind of way, which usually results in failure. An illustration of this is found in the Cawnpore Grass Farm, where sufficient attention had not been paid to the kinds of grasses suited to the soil and climate of the place, while there is scarcely room to doubt that other important matters may also have been overlooked. The operation is imperfectly understood, and there will be found few indeed who have studied the subject and to have thoroughly mastered it. A contemporary truly observes: "unfortunately, it is only too manifest that the knowledge of the culture of grasses has not kept pace with the times."

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There are few operations the success or failure of which is more largely dependant upon the manner in which the practical details of the work are conceived and carried out than laying down land to pasture, and the following hints, by a writer who knows what he is saying, might be kept in mind when laying down grass :—

To begin with, land to be laid down to permanent grasses, or even to grasses for several years, must be thoroughly drained either naturally or artificially. If this point is overlooked all other efforts and outlays will be to a large extent in vain Land that is water-logged and sour never will carry the finer sown grasses it will speedily throw up instead a coarse, unwholesome, worthless variety of herbage. In land therefore, with a tendency to this nature, draining should be the first operation. Then the land must be in very good heart. It is to lie untouched for years, perhaps for generations. Do not cover it up in poverty, thinking that you may afterwards feed it from the surface. Let the soil be well nourished with substantial plant food when laid down, and be assured that if you do justice to it in other respects, it will in full measure repay you for your timely generosity to it. Next to liberal and judicious manuring comes thorough tilling and cleaning Every speck of weeds should be eradicated, for it will be difficult afterwards to clear away any that might appear amongst the grasses. Moreover, weeds would be poor substitute for the fine sown grasses—why leave weeds to flourish on the fat of the land? Then as to tillage, it should be done thoroughly, timely, and in all respects with good judgment In this connection the nature of the soil is an important consideration. Do not overlook it. To cultivate when wet, some land intended for grasses, notably stiff land with a tendency to 'cake', would be simply ruinous. Till the land when it is in a favourable state for tillage, and if in right condition, the more thoroughly it is tilled the more likely it will be to give satisfaction in its crops.

The variety of grasses must be selected to suit the soil, climate, and the purposes in view. The '*doob* grass' for instance will not grow on land that is water-logged. Soil impregnated with lime, such for instance as that in places abounding, in *kunker*, will suit the *doob* to perfection. If it is desired to lay down only this variety, then it would be advisable to spread pounded *kunker* over the land and work it into the soil. *Kunker* abounds in the N.-W. Provinces, the Punjab, and in fact

in nearly every part of India. It is valuable for application to the soil generally, containing as it does, a great deal of carbonate of lime, and a small proportion of magnesia, iron and alumina. The value of this *kunker* as a manurial agent has not been sufficiently understood or appreciated, and we draw attention to the subject here, as most grasses luxuriate in a soil impregnated with lime.

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WRITING on the subject of paper making in India, *Indian Engineering* says :—"We learn that the Titaghur Mill is about to increase its plant, which will tend to lessen the cost of paper in the Bengal market, and doubtless affect foreign importation to some extent. Calcutta supplies the want both of Madras and Burmah in the matter of stationery. We are informed that in Madras alone last year "local purchases" of stationery exceeded 2½ lakhs of rupees, and that this was mainly due to the substitution of the Bally Mills Company's paper for that formerly imported from Europe. It was recently suggested that the card board used for Railway tickets in India might be manufactured by the Paper Mills of the country, but such a suggestion could only have been made by some one ignorant of the fact that the card board in question demands special appliances restricted in England to only one or two establishments which supply the like requirements of the Continent of Europe and other countries."

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THE returns of railway-borne traffic for Berar show that during the quarter ending 30th September 1886, there was considerable activity in trade, while the figures record a very satisfactory increase, both in the import and export trade of the province. The former increased by no less than 1,10,084 maunds, and the latter by 2,31,107 maunds. The chief item of import was coal from the Warora mines in the Central Provinces. This will we understand, do away with the importation of coal from Bombay, and is a very satisfactory feature of the returns. There was a good increase in other items as well. The exports were chiefly remarkable for a very large increase in the quantity of wheat sent to Bombay, which was no less than 2,027,550 maunds. There was also an increase in other items, such as raw cotton, *jowari bajra*, and *til* seed. The only item that shows a falling off is linseed, which decreased by 27,129 maunds. This is attributed to the small outturn of the previous year. It, however, represents a loss of nearly a lakh of rupees to the province, but is more than recouped by the income from the very large quantity of wheat exported

THE following is a summary of Messrs. Wm. Jas. and Hy. Thompson's fortnightly circular of Indian tea, dated London, Thursday evening, 16th December, 1886 :—Since the issue of our last circular about 58,000 packages have been brought to auction, including 52,000 packages of fresh import, 4,400 from Ceylon, and 1,000 packages of reprinted tea. The bulk of the supply continues to be tea of fair medium character, containing a large proportion of good useful broken and whole-leaf sorts, which have been freely bought by the trade at from 6½*d.* to 7½*d.* for Broken, 7*d.* to 8*d* for Pekoe Souchong, and 8½*d.* to 9½*d.* for Pekoes, with a few sales of common tea under these quotations ; the demand, however, has not been strong enough to prevent weakness and irregularity, notwithstanding the larger consumption which is resulting from the low prices. For fine descriptions the market has been stronger , but for teas just below "fine " grade, rates are generally lower, the supply of tea coming within this description being rather plentiful, owing to a falling away in many Assam and Darjeeling invoices from the fine make and liquor of earlier shipments. Taking the quality of the imports, however, as a whole, there is less ground for criticism or complaint than at one time in the season ; and it is in the general position of tea, and in the abundant supplies from all the producing countries, that the reason for the present depreciated values will be found.

AN analysis of the figures for the first six months of the current season—and especially for November, when the proportion of Indian taken for home consumption was 43% —points to a total delivery for the season of not much less than 74 million lb., assuming that prices remain at present level. The supply is not likely to materially exceed this, as from a reliable source in Calcutta we learn this week by cable, that the export will probably be 74 million lb., to which may be added 7,50,000lb. from southern and western ports. As stated in our last circular, the shipments to 30th November showed 5¼ millions increase ; the totals being 53,000,000 for 1886, and 47,800,000 for 1885, and not as was therein wrongly printed. During the first half of this month 4,500,000 lb., were shipped, making the total to date 57½ millions against 52¼ last season. About 39 millions have been sold to date, and including next week's sales, 40 millions will be sold by the end of the month, 5 millions more than at same date last season—so that the greater part of the surplus is practically disposed of, and has been already absorbed by the trade : no disposition, however, is manifested to take a confident view of the future, and the prospect of heavy sales during the next two months seems to oppress the buyers. Our telegrams from Calcutta state that the teas now being shipped are mostly of good flavour and quality, but deficient in make and tip, and containing only a small portion of good Broken Pekoe. Last week about 14,000 packages were sold at 7¾ annas average. Sales were not held this week, but on the 20th about 20,000 will be offered. The demand for Ceylon tea is well sustained, and rates rule very firm, especially for fine liquoring grades between 1*s.* and 1*s.* 6*d.* The average of past few weeks' sales is nearly 1*s.* 3*d.* per lb. Our next circular will be dated 6th January, 1887.

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WOODEN pavements have long been used in Europe and America, where they have been found to give much better wear than the ordinary materials used for metalling roads. We are glad to see that wooden pavements have been introduced into Calcutta. *Indian Engineering* says :—Our attention has been invited to the gate and portico roadways of the E. I. R. offices, Calcutta, where wood has been used for the first time in the Indian Metropolis as a surface material for pavements. In this case the pavement consists of rectangular blocks of wood seven inches deep, set on end, that is, with the fibres vertical, resting on a bed of portland cement concrete four inches in depth. The blocks are four inches wide, but of variable length, and laid diagonally from the centre line, herring bone bond, on either side. Felting is interposed between the blocks, and the interstices above filled in with gravel or khaimera. The top edges of the blocks are bevelled, and the pavement presents a neat appearance. These pavements have been extensively used in Russia and America, and were introduced into London in 1835. If we recollect aright a communication to the Scottish Society of Arts showed that blocks so placed with the end of the grain exposed wear less than granite "

THE following is the official summary of the reports on the state of the season and prospect of the crops for the week ending 5th January 1887 —Except in the North-Western Provinces and Oudh, the Punjab, Rajpootana and Assam, where there were slight showers in a few places, the week under report has been rainless. The *kharif* harvest still proceeds in Bombay and Berar, but in all other parts of the country it has been completed. In Madras the paddy crop is being cut with generally an average outturn. In Mysore and Coorg the standing crops continue in good condition. The rice harvest is approaching completion in Bengal, Assam and Burmah, and good outturns are expected. In the Central Provinces the crop is being threshed, and in Bombay and Coorg the crop is being harvested. In Bombay and Berar cotton-picking is in progress. The prospects of the poppy crop continue generally favourable in Bengal and the North-Western Provinces and Oudh. The prospects of the *rabi* crop are generally very favourable throughout the country, though in the Punjab and the North-Western Provinces and Oudh more rain would be beneficial. The public health is good in all provinces. Prices are generally stationary everywhere, except in the Punjab, where they are rising in four districts.

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A LITTLE time back we had occasion to notice a letter signed "Dounsal Hall" in the *Simla Argus*, in which the writer made

some interesting remarks regarding the successful cultivation of the Russian Saxonska wheat in the Punjab. We asked "Dounsal Hall" to favour us with further particulars regarding this wheat, but though he is a reader of the *Indian Agriculturist*, he has not responded to our call. In a recent issue of the *Simla Argus*, the same writer, in the course of an essay on the currency question, makes the following remark regarding Saxonska wheat :—" Fifteen years ago England imported ten million *cwt.* a year of wheat from Russia, and eight thousand cwt. from India, she now imports five million cwt. from Russia, and eleven million cwt. from India. America now supplies twenty-two million cwt. of wheat to the United Kingdom." (*vide* "Fireside News," 5th November 1886, London). The Russian Saxonska wheat sells in Mark-lane at 52 shillings per quarter of 496lbs, and the best Indian white wheat at 49 shillings per quarter. The Russian Saxonska wheat has been most successfully acclimatised in the plains of the Punjab, and the seed thereof sent to the writer (who first introduced this seed), is now growing at Kotgurh, thus demonstrating that the Punjab hills and plains produce the best Russian wheat, if the seed wheat be forthcoming; and as England will gladly purchase five million cwt. thereof, the Russian Wheat Trade expires, as soon as India is able to supply the demand. The struggle with America has next to be encountered, and as the conquest is only a question of time, England will have to pay the Indian zemindars for twenty-seven million cwt. of wheat in addition to the present supply of eleven million cwt ; making a total of *thirty-eight* million cwt. to be paid for in London sovereigns.'

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GAS lime has been found very effective in the destruction of fungoid growth on soils, and also for other enemies of the farmer in the way of insect pests. A 'farmer' writing to an exchange, says :—" In my experience it is the most effective substance that is to be had for the destruction of fungoid and insect pests in the soil, and applied to the fallow at the rate of about 5 tons per acre, there need be little fear of finger-and-toe." There has been however some enquiry as to the effect of gas-lime on crops, and some uncertainty as to the safety of using it. On this point the same writer says :—

This substance should be freely exposed to the air for two or three months before applying to any soil on which is a growing crop, because besides many sulphides it contains a compound of sulphur and cyanogen that is very deadly to plants. It may be applied to the fallow so as to allow sufficient time for oxidation to alter the poisonous qualities of the cyanogen. It is perhaps best to slightly harrow it into the stubbles after they have been ploughed, because in this case the ammonia —or a portion of it—resulting on the conversion of the cyanogen will be retained in the soil if there is in it lime, salt, kainit, or substances containing bases on which the ammonia can form as nitrates. This simple view of it may be borne in mind in making it into composts, for unless there are substances on which the ammonia can form, it will combine with carbonic acid and escape into the air. The compost should therefore contain a little superphosphate, salt, or kainit or even a small portion of old lime, But in making a compost heap, it must be kept well away from a growing fence or the roots of valuable trees, or it will kill. them."

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ANOTHER writer on the same subject says :—Probably the best use that gas-lime can be put to is on grass land, and especially land that is troubled with moss. On badly infested, sour, damp, mossy land, it may be spread neat. Where the land is not so badly affected, it is best mixed with soil or road scrapings into a compost in the autumn, turned and applied to the land in the spring. Gas lime has been frequently recommended as a cure for wire-worm in arable land. Some years ago, in order to test this, we caught some of the pests, and then placed them in the centre of the gas lime. After several days the place was opened, and the wire-worms were as lively as ever. After such a test, we decided that when mixed with the soil, gas lime would have little effect as a curative for wire-worm. The best remedy for insect pests in plough land is probably a dressing of liquid manure. If any thing is required on plough land to stiffen the straw of grain, &c., fresh lime and soil made into a compost will be found the best.

SCIENTIFIC horse judging is the latest suggestion put forward for the utilization of science. A writer in a Scottish exchange calls attention to the subject as one of importance. His plan is to take 100 points as the standard of excellence, and then he explains himself thus:—"Let us first examine the horse's mouth, head and neck ; second, his shoulders, back and ribs, chest, and fore-legs ; third, his hindquarters (high and low), his hocks, legs feet and pasterns ; fourthly, his walking square on his legs, and constitutional soundness and thorough development in all his actions. Then, under these four aspects, give 25 points each to the perfect horse. Then in the awards the judges should have to state, in writing, one, two, or three points of the standard, owing to the deficiency of any one point under the four heads ; but if he has only the smallest defect in any one point of excellence, take off one point, and so on, according to the merit of the horses. To continue this new method, let three competent men be selected, and let them be allocated by the directors to their several classes ; then let the rings be large enough to divide by rope or rail inside these large rings in three sections ; then every judge takes his own classes ; then instead of one class, there would be three classes, judging at once in the male section and three in the female section, and so on. With all the other sections of horses exhibited at our shows under such a system, our shows would become instructive and interesting to all. No longer would there be a grievance to any, because the judging would be got through in far less than half the time occupied under the present system of judging, and our agricultural societies' shows would be better attended, and give perfect satisfaction to all classes of society. And now that the general meetings are being held of the members in connection with all our principal shows, I sincerely hope that this letter may appear both in time and place, and that ample justice may be forthcoming, and the wrangling will ere long be a thing of the past, when we are educated to do as we would like to be done to."

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A SPIRITED controversy has been going on for sometime past in the columns of our contemporary, the *North British Agriculturist*, on the " progress of ensilage." A writer in a recent issue has some sensible remarks to make on the subject. After premising that there is ensilage *and* ensilage, he says :—" As one who has visited many silos, I may say that I have found in some a product that I would not feed to stock, whilst in others, the ensilage seems to give a food that I should describe as a blending of hay and roots, comparatively dry, sweet, and aromatic, sufficiently like unto hay to form a nitrogenous food, yet retaining the necessary laxative juices of the grass to form a food substitute for roots. Ensilage such as this, with the addition of a little meal, form a first-class food for milk cattle. Such is the silage made at Lindal Moor Farm by Messrs. Harrison, Ainslie & Co., of which Mr. Ainslie, M.P., is the managing partner. Experiments have been made with the milch stock, some of them having been kept exclusively on a silage diet, with the addition of a little meal, and others on hay, silage, roots, and meal, and it has been found that both in condition and milkness the silage-fed did quite as well as the others, whilst the butter from the silage-fed cattle was said to be superior. In filling the silos, time is given for the rise of a proper temperature ; it does not seem to matter whether the grass is put in wet or comparatively dry (the wet grass is said to make the more palatable silage), but the whole is rolled as it is put in. The manager of the firm believes that in this rolling consists the great secret of making good ensilage, for only by this means can the air be thoroughly got out of the mass. It is then weighted at about 120 lbs. to the square foot. Turnips are grown and hay is still made, the silage being looked upon as an auxiliary food. At the home farm of the Duke of Devonshire at Holker, the silos are not opened until the spring, and the ensilage is brought into use at the time when the roots are giving out, and before the growth of spring grass has set in. This seems to be the most sensible use for ensilage, for, without the aid of meal or hay, it is cold food for stock in our northern climes in the depth of winter. In the use of silage, as in every thing else, a little common sense will be found an invaluable adjunct. Persons who claim for their hobbies all the con-

centrated virtues under the sun, are the greatest enemies of useful inventions, causing a revulsion of feeling calculated to raise distrust. I have not yet seen a decent ensilage made from oats, and to cut and ensile a crop at that stage seems a foolish waste of valuable feeding material. Far better, if in bad weather, let it come to maturity, and then cut for stock."

ENSILAGE competitions have now become quite common in England. In the report of the recent Smithfield show, we find the following notice regarding the ensilage competition :— "The judging of the samples of ensilage sent in competition for the prizes offered by this society, took place on Wednesday. In the ten classes there were 145 entries, comprising specimens of almost every description of ensiled crop. The champion cup was awarded to Mr. C. G. Johnson, of Croft, Darlington, for an admirably made specimen of ryegrass and clover second crop, pressed in a stack by his patent method. It will be remembered that Mr. Johnson won the £25 prize offered by the Royal Agricultural Society for the best stack in England and Wales. In the class for meadow grass, out of 47 entries Mr. R. Loder, of Whittlebury, Towcester, was first (and reseive for champion) ; Mr. T. Charles, of Much March Herefordshire second ; and Mr. John Morris, of Hereford (winner of the Royal Agricultural Society's £100 silo prize), third. In the special class for meadow grass made in a stack, the sample' to be so taken as to form a section of the stack, 3 ft. from, and including the outside,' Mr. E T. Blunt, of Leicester, took the prize, Mrs. Mary Allen, of Leicester being reserve. Mr. W. C. Cazalet, of Dorking was first; Mr. H. M. Proctor of Spalding, second ; and Mr. H. Hoare, of Staplehurst, third in the class for clovers. The class for ryegrass (alone or mixed with clovers) was headed by the champion sample of Mr. C. G. Johnson, the second prize going to the Aylesbury Dairy Company and a sample sent by the Ensilage Press Company of Liccester being very highly commended. The Duke of Manchester and Lady Ashtown were highly commended in this class. There were only six entries in the class for grain crops but all were good. Mr. John Swan, of Stonefield, Lincoln, was first, and Mr. R. G. Smith of Sewerby, Hull, second. There was a capital class of 10 entries of maize. Mr. John Swan coming first and Mr. J. E. Platt, of Cheadle, second. In class 7, for tares and other leguminous plants, the Aylesbury Dairy Company were first, and Mr. R. Whitehead of Crawley second. The class for hopbine only contained one entry which was absent. In the class for fern there were four entries, the prize going across the Tweed to Mr. S. Farish of Lockerbie. In the "any other" substance Mr. C. G. Johnson was first with a sample made from a mixed crop of tares, oats, beans and peas, Mrs. Mary Allen taking second prize with pea haulm. The classes for model packages, &c., will be judged at the society's stand (No 39) in the Agricultural Hall, where also duplicate samples of the successful samples of ensilage will be on view. The complete show of the ensilage samples will remain for inspection at 28, Museum-street by kind permission of the Dairy Supply Company. It should be added that the judges of ensilage were Messrs. Joseph Darby, Bernard Dyer, F. C S., W, J Harris, J. Nuttall and Garrett Taylor. For the champion award, there were added to these Messrs. H. Kains-Jackson and Gilbert Murray." It would not be amiss to introduce something of the kind out here, especially at the numerous horse, cattle and agricultural shows held at various places in this country. It would, we think, be an incentive to the more extended adoption of the ensilage system in India

THE PRINCIPLES OF LAND ASSESSMENT.

II.—AGRICULTURAL GEOGRAPHY AND THE NATURAL CLASSIFICATION OF SOILS.

THE first step in soil classification must be simply an arrangement of soils in groups according to description. Any attempt to assign relative values at the outset must fail ; as was shown in the paper on "The Calculus of Rent," * the relative values of soils must vary both in space and in time. In populous districts and near towns, soils of poorer quality will come under cultivation and will pay rent, while at a distance precisely similar soils wanting the same advantages of situation will remain uncultivated, and will pay no more than the value of the natural products (the "grazing fee"). In the same way soils at one time regarded as unfit for cultivation, will, as population increases or as communications improve, be brought under cultivation and pay true rent. Now it was shown that no relation exists between the rent of cultivated lands and the "grazing fee" which may be obtained for the use of lands unsuited at the time or place for cultivation ; and rent itself being in the form of a remainder, (not a ratio) every change of prices or rate of production which affects rents will destroy the ratio which previously existed between rents.

Any classification of soils based solely or chiefly on analytical methods is at present out of the question. The productive power of soils cannot be inferred from the most careful chemical and mechanical analyses, even if such analyses were practicable on a large scale which they obviously are not. A basis of valuation cannot then be looked for in mechanical analyses alone, even when carried out on rigorously quantitative methods Still less can be expected from this method when the quantitative element is entirely wanting or is based on guess.

More is to be hoped from a classification based on a study of the origin and history of soil. Soils result from the disintegration and decomposition of rocks by the agency of climate, and of animal and vegetable organisms. There appears to be good ground for the assumption that soils derived from the same rock in the same climate are of like composition and of like productive power.

That rocks confer distinctive characters on the soils derived from them is a fact too well known to need special proof Sometimes the characters are so remarkable that the origin of the soil can almost be inferred at sight. The red soil derived from the haematite schists in Dharwar, Sirsi, &c., are remarkably alike in appearance and texture. The quartzites or very sandy soils which, within certain limits of climate, appear to have a special indigenous flora of their own. Sandy soils are also derived from the gneiss where it occurs without penetrating dykes, the soil becoming more loamy as intrusions of diorite or alternating schists make their appearance. A reddish loamy soil is formed from the schists alone (*Lasemeshrarte*).

The constancy of chemical composition in igneous rocks is a fact of interest to agriculturists. Rocks of the acid type-granites, shyolites-containing the highest percentage of silica are found to be richest in alkalies (potash, soda.) Rocks of the basic series, (grabbros, basalts) with a low silica percentage contain a higher proportion of magnesia and lime. Rocks of the syenite and andesite series, named "intermediate" as to silica percentage, appear to be intermediate in composition as regards the principal bases. The basic series of rocks are also richer in iron and manganese. All the bases named are of significance for agriculture, either as indispensable ash constituents, or because their presence in the soil indirectly favours the appropriation of plant-food by the roots, or in respect of their possible appearance in forms injurious to plant-life, (iron in "ferrous" combinations, lime in excess).

In studying soils with reference to their rock origin, not only the "solid geology" but "drift" formations of every kind must be brought under examination. Among these we must probably include most of the black soil, the most important of all, and perhaps the most difficult to study successfully. That much of this soil owes its present position at least to alluvial

* *Indian Agriculturist*, April 24th 1886.

action is shown by the fact that in extensive blacksoil plains on low levels, the abandoned bed of a stream is soon filled with black soil; the site of the blacksoil plains at the lowest levels of river-valleys also suggests an alluvial origin. But black soil is also found in thin layers on high undulating ground where it cannot possibly be of sedimentary origin. The soil is not limited to any one rock formation, it occurs on traps, gniess, schist and limestone, not perhaps on haematite schists and laterites containing a high percentage of iron. It shows the greatest variation in texture, from the sooty-black, granular powder in which the unaided eye can scarcely detect a foreign particle, to coarse mixtures of clay, tufa, and even small pebbles.

The sub-aerial accumulations could be studied with reference to the rock formation on which they occur. The classification of the alluvial accumulations might perhaps be facilitated by noting the rock formations through which the depositing stream reaches the plain; some of the variations of texture will be found in the succession of strata in the black soil itself. The highest layer is the sooty powder. Beneath this is a black clay often with a lustrous sub-conchoidal fracture; this again rests on coarser deposits on tufa. Any member of the series may be exposed on removal through denudation of the next member above.

In the history of soils, climate is probably of greater importance than rock origin. As regards agriculture, there can be no hesitation in assigning the place of highest importance to climate. The forms of agriculture are seen to be adapted to the climate, and persist through all changes in the geology.

To organise a survey of climates seems at first sight a hopeless project. It appears, however, that even slight changes of climate are accompanied by changes in the form of agriculture, and in the indigenous flora; and the boundaries indicated by variations of the kind, are often defined with considerable sharpness.

On the Deccan plateau the limits of botanical and agricultural distribution can be determined often with remarkable exactness. Three or four zones are to be recognised lying parallel to the line of the Western Ghats. Starting from the brow of the ghats, a route taken in a north-easterly direction crosses all the belts in succession. The westernmost belt adjoining the ghats is about fourteen miles broad. The somewhat rugged contours, steep scarps and deep ravines are characteristic topographical features, such as might be expected as the natural consequence of the heavy rainfall. The chief feature of the natural vegetation is the evergreen forest. The staple crop is rice, sown in seed-beds at the commencement of the heavy rains, and afterwards transplanted. Travelling eastward we find the evergreen jungle completely replaced by deciduous forests in which teak is prominent. Here the rice is drilled; the transplantation system being quite unknown. At the same time dry crops begin to be cultivated on the higher lands. To the eastward the rice cultivation steadily diminishes, giving place to dry crops which ultimately replace the rice altogether. With the last of the rice fields, the teak jungle also disappears. The crops, among which *jowari* is the most prominent, are seen to be cultivated on the *kharif* system; still further inland, we find the *kharif* supplanted more and more by the *rabi* system. In this, the dryest region, the natural vegetation is found to consist largely of thorny acacias, euphorbias, &c., plants adapted to a dry climate.

Noting everywhere the salient changes in the indigenous flora and in the agriculture, materials may be collected for a highly instructive agricultural and botanical map of the country. For minor sub-divisions, the distribution of single species, particularly of "weeds," would be a useful guide. The species selected for the purpose should be common plants, abundant where they occur, but limited in some one direction by a well defined boundary.

The agricultural zones described above could, no doubt, be traced throughout the country known as Western India. It might be expected that over such an extent of latitude the variations in the amount of heat received from the sun must cause sensible changes of climate, which should be manifested in corresponding changes of the flora and the form of agriculture. And changes of the kind can no doubt be traced, though whether these are all due to variations in the amount of sun-heat, must remain an open question. The southern district of north Canara is remarkable for its spice gardens, generally laid out in deep ravines, where the roots of the areca palms are within easy reach of the perennial water level. In the shade of the trees, the pepper vine and cardamoms grow. In these districts, the dwarf date palm (*Phœnix farinifera?*) is a conspicuous member of the indigenous flora, and is limited in an easterly direction by a boundary almost coinciding with that of the spice-gardens. It would be interesting to determine whether wild palm and areca nut cultivation are conterminuous in a northerly direction. In the northern districts of north Canara, coffee is grown on a small scale with a view to profit. The coffee plant flowers and fruits in Dharwar, but the limit of profitable cultivation must here be nearly reached, if not already passed

At Dharwar, a species of senecio (*S. tenuifolia*) is very abundant as a wild plant growing on higher grounds in the rice district. In Belgaum this species is completely replaced by *Senecio Belgaumensis*, which is again left behind on reaching the Satara districts. It is difficult to point out any important change in the modes of agriculture from Dharwar to Tanna, and the peculiar characters of the north Canara agriculture may after all be due not to latitude, but to the narrowing of the peninsula and to the influence of winds and rains from the Bay of Bengal.

To summarise the procedure of a survey based on the above principles. The country is first mapped into natural districts, according to the distribution of the more important forms of agriculture and types of natural vegetation. These districts are divided again into smaller tracts, according to the distribution of species with a narrower range. Within each tract soils are mapped according to rock formation and sub-divided into groups, according to depth and other characters affecting producing power, so as finally to arrive at groups the members of which are of equal productive power. As yet no numerical values have been assigned to the groups, the procedure has been one of classification simply. The productive power of each group is now to be inferred from observations of the fertility of any members of the group, but is to be *determined independently* for each group. The tracts must now be again mapped into areas, within which all the lands are equally favoured by communications, nearness of towns and political advantages generally. Within these areas the rent is to be determined independently for each group by any of the methods given in the chapter on rent. *There is no assumption that the rent of one group must bear some particular ratio to the rent of another group,*

It would not be possible to organize a survey on these principles without much preliminary study and exploration. But it is possible with the help of existing organisations to collect materials, out of which in a few years a very valuable approximate map of natural districts and tracts could be constructed without the help of any systematic survey.

Several uses may be suggested for a map constructed on the basis of the rough survey proposed. It would no doubt prove a reliable guide for the mapping of famine areas. The natural districts or tracts in which famine had already occurred could be noted, and the tracts more nearly related as regards floral and agricultural distribution would be indicated as liable to suffer in future.

It is impossible to frame any inductions from records of chemical analyses of soils without the help of a natural grouping, such as is here described. Without classification of soils a chemical analysis can be considered to hold only for the place at which the soil was collected; and thus valuable method of investigation comes to be looked on as too costly for use. There is no reason why something should not be learnt of the chemical constituents of a whole group of soils from a small number of analyses. There is at present no classification of soils, which affords any guidance in applying the results of crop experiments, records of sales and transactions in land.

So far utilitarian objects have alone been considered. It is obvious that a map of the kind advocated, would possess a botanical as well as an agricultural significance, and could be made the basis for a systematic study of the geographical distribution of plants over subordinate areas. Any one who examines a catalogue of a local flora must be struck by the vagueness of the terms used to denote the range of flowering plants. As often as not political divisions, names of estates and

provinces, are employed to indicate distribution. No order can be introduced into the study without some improvement in the method. If local floras could be furnished with maps of the natural districts, the distribution of single species could be described with far more lucidity and scientific precision. There seems to be no reason why agricultural boundaries should not be employed for this purpose; they are often more obvious, and it is almost certain that they follow truly natural limits of climate. But the first maps for scientific study should be drawn from a knowledge of the distribution of single species, the species selected for the purpose being what are known as "common plants." The object is of course to construct maps of vegetation-formations as studied by Grisebach in his "Vegetation der Erde." But the early knowledge of a flora does not give sufficient grasp of the facts of distribution to furnish even the general plan of such a map. The distribution of a comparatively small number of single species can be studied with greater ease and certainty, and with a more limited knowledge of the flora, and materials for some important boundaries could even be found in rich herbaria as those at Kew and Calcutta. Some of the boundaries selected would turn out to be due to accident and to coincide imperfectly with the truly natural limits due to climate, but the method on the whole is sound; with better information the boundaries could be readjusted, and study of geographical distribution would advance

A Y.

ENSILAGE EXPERIENCE IN ENGLAND.

No one will question that the system of ensilage has made great progress during the past five years, especially in England; and it is generally believed that Farms of any pretension are not now considered complete without a silo or two. It may also be said that the recent Royal Ensilage Commission has done a great deal towards familiarizing farmers and others with the *pros.* and *cons.* of the system genenerally. Yet it is astonishing to find how many there are among English farmers and large landed proprietors who, though they devote much of their time and attention to agricultural improvement, have no experience whatever of ensilage, and in all probability have never *seen* silage or a silo. This ignorance on the part of English agriculturists is illustrated very forcibly in an article by Mr. Henry F. Moore, on the winter of 1885 86, published in the last volume to hand of the *Journal of the Royal Agricultural Society of England.*

Mr. Moore tells us that he was commissioned by the Council of the Society to institute enquiries among its members, and other practical men, into the lessons taught by the season, and into its effects on the agriculture of the country. To give effect to this he sent out to some 450 members of the Society, a series of fourteen questions, one of which was whether they had any experience of ensilage. Of this number some 350 replied, from which Mr. Moore selected the most noteworthy, (55 in all), whose replies he has embodied in his paper.

It will perhaps astonish our readers when we tell them that out of the 55 members of the Royal Agricultural Society of England who replied to Mr. Moore's questions, nearly two-thirds (33) of the members actually had no experience whatever of ensilage! Some stated there were no silos in their neighbourhood; one said there was a silo in the neighbourhood, which had been erected two years ago, but that it had never had a load of grass or other green food put into it: another, that he did not believe in the economy or usefulness of silage. One irate member—a colonel—said: "I hate the stuff! It is more like muck than anything I know." Considering that he had *no experience,* (according to his own statement), of ensilage, it is difficult to understand how he came to compare it with "muck."

By those who had had experience, the most flattering, testimony is borne to the value of silage, that of Mr. Henry Woods, agent to Lord Walsingham, (President of the late Royal Ensilage Commission), is about the fullest, and we quote it *in extenso* for the valuable lesson it teaches. This is what he says:

"I believe I may fairly say that I have had a good deal of experience of silage for some years past, and especially during last winter and spring. I need scarcely say that it was no easy matter to carry upwards of 70 head of horses, 100 cattle, and 2,300 sheep, through a long winter and late cold spring, with a very short supply of roots, little straw (the corn crops of 1885 being light and short of straw), and an extremely scant supply of hay. However much we might have been disposed to purchase artificial foods, they would have done comparatively little good unless there had been the means of giving with them a more bulky and digestible food to fill the animal's stomachs. Here then was an instance where the advantage of having silage was beyond all possibility of doubt. It is known by practical and experienced men that when straw on light land is of slow growth, it is tough and indigestible; to have given animals chaff made from such straw without the admixture of some other food more easy of digestion must have had the effect of producing many ailments from which they would otherwise be free. On Lord Walsingham's farms in hand, the animals were fed on mixed straw chaff and silage with a limited allowance of artificial food; they remained healthy throughout, and did remarkably well. Upon one farm the old shepherd most strongly objected to the idea of having a little kidney-vetch silage put into troughs in a forward fold, for the lambs to pick at when the few trunip tops there had been, were done. It was, however, insisted that the order must be obeyed. A few days after the silage had been given as directed, four lambs were taken with scouring, their coats st r'ng a d they looked in anything but a satisfactory state. The shepherd came to me at the fold in a most doleful frame of mind, and said, 'That silage is, as I expected, *regular* upsetting the lambs, and you will see that it will kill a lot of 'em.' After carefully looking among the ewes and lambs, I saw what had caused the scouring of the four lambs, and then, to the shepherd's horror, I remarked, 'Now shepherd understand me clearly when I say that the lambs shall have the silage as directed, if it kills the whole lot.' This seemed too much for the old man, and he did not say another word, but his countenance clearly showed what he felt. It was only natural that he should feel alarmed, for he has a pecuniary as well as a professional interest in the successful rearing of as many lambs as possible, I purposely kept away from the ewes and lambs for at least a fortnight, but told the bailiff to keep a sharp eye on them, and to let me know if anything further went wrong. I had no unfavourable report from the bailiff. The next time I went to the sheep, the shepherd lost no time in approaching me, and the look of his face showed clearly that he was out of his trouble, He remarked, 'It was *rare y* wrong about the silage upsetting the four lambs you saw. They soon got all right. Look at my lambs now, and see how well they are doing.' It was quite true that they were doing well, and have continued healthy and thriving ever since. It is said they are the best of lambs on any light land farm in the neighbourhood. The ewes had a mixture of silage and chaff It is worthy of remark, that while a flock of ewes on a neighbouring farm did not do well during last winter and spring, and came out of their wool very low in condition, the lambs looking unthrifty and stunted, the sheepshearers declared that they had seen no ewes this year anything like so fresh in condition or producing better wool, nor lambs looking more thriving and healthy, than those on Lord Walsingham's farm to which I have referred.

"I should perhaps add that our silage is made in close silos, and is well trodden and rammed after having been passed through the chaff cutter By incurring the slight additional cost of these operations we secure our forage with the smallest possible percentage of loss in its weight, and if the amount of acid developed is sufficient to indicate the progress of chemical change, it is not injurious to the animals consuming it, nor is it so considerable as in many approved samples of so-called 'Sweet' silage."

Another member said he considered no farmer safe, or farm complete, without one or more silos. Mr. Faunce de Laune, a well-known writer on agricultural subjects, and one who has had considerable experience with silos, said the silage he made proved of great value during the long severe winter; "and when chaffed up with straw, it proved an excellent winter food, as it seemed to moisten and give flavour to the straw, which was then freely eaten by sheep." He, however, considered it advisable to give a highly nitrogenous food with silage. Mr. H. J. Sheldon, of Warwickshire said:—"At the end of last June I made a silage stack of about 16 acres trifolium, with a great deal of shed oats in it. I pressed it with Amos and Hunt's Chain Gear; it was excessively hot for several months, but after Christmas it came out some first-class sweet ensilage. No waste, except about 7 or 8 inches at the outside, where it was dressed with salt. No mould or any influence from the outside air, reached beyond that distance. I have given it, in conjunction with other food, to a large number of cow stock

who ate it well, and it does them well. I shall make more this year, being very pleased with it." A farmer in Worcestershire said that ensilage had been tried on an estate, where he was agent in 1883, with entire success, and is now adopted on a large scale. He added: "I entirely believe in it." Professor J. P. Sheldon, an authority on agricultural matters, in his reply said:—"Personally, I have no experience in the use of silage. I do not winter stock enough to make it worth my while to go in for it. A neighbour has used it two or three winters with satisfactory results to his dairy cattle. He is decidedly in favour of it, and intends to continue the practice, though he is careful not to have too large a portion of silage. Used with discretion, he regards it as a valuable variation in the food given to dairy cattle in winter and spring; it enables him to keep more stock, and he has not found any ill-effect from the use of it, either to the cattle themselves or to the cheese and butter they yield. He is, however, an uncommonly careful and systematic man"

The reply sent by Earl Powis is very decisive. He said: "We preserved in a silo about 90 tons of green clover and rye grass, put in uncut and weighted with stones. The contents we gave to dairy cows during winter, two feeds per day of silage and three of hay. The quantity of milk was increased, the quality improved, and the cows kept well up in their condition." A large farmer of Carnarvonshire said:—"Silage was most valuable. I used it for milking cows as a change of diet: for yearling and two-year-old bullocks housed in a covered yard, as their main supply of food. I got the sheep to eat it, and in this respect it was most useful and handy. I have not any good statistics as to weight, &c.; but some of its advantages are the quickness and handiness with which a large number of beasts can be foddered; no chaffing, slicing, or cooking is required; the food is ready and succulent whenever it is taken out—and what is not used can lie by till next wanted; it is very wholesome food. Beef fed on it is like grass-fed beef as distinguished from stall-fed."

Mr. Moore in summing up the replies on the question of ensilage says:—"The reader of the various replies on the question of Silage will be struck with one fact, which is most curious. There are many who have no experience of this new food; but no single one of those who have kindly replied to my queries, and who have tried the system, are found to condemn it. Mr. de Laune, who has had a large experience with the silo, sums up the whole lesson of the winter by saying that it teaches us to "make more silage, and feed it with chaffed straw," I cannot say more on the question than this—all who have used it declare that, without it they could not have gone through last winter as they did. Mr. Scarth's experience of sweet silage made with the Johnson's patent stack system may also be referred to, as showing how experience supports the award of the Society's silver medal to that system at Norwich." With such testimony before us it is impossible to entertain a single doubt that silage can ever prove anything but beneficial to dairy and other stock. In every case where bad effects have followed the use of silage, the cause has been traced to badly made silos or an ignorance of the system; and wherever the contents of a silo have turned out a failure, the cause may safely be attributed to an ignorance of the method of making it.

Miscellaneous Items

The Meerut grass scheme, it was stated some little time ago in the *Pioneer*, had been closed. It is now under consideration, however, to resuscitate it owing to representations made by the Commander-in-Chief to the General Officer commanding the Meerut division.

The English farming interests are in need of a Minister of Agriculture. A contemporary tells us that a Council meeting of the Wakefield branch of the West Riding Chamber of Agriculture was held at Wakefield the other day when a resolution was adopted to the effect 'that while endorsing resolutions passed at the Lincoln meeting, this Chamber is of opinion that the appointment of a Minister of Agriculture is the first and most important object to be attained for the advancement of agricultural interests in this country.'

M. Vesque is, we understand, continuing his researches on the functions of the epiderm, or skin of the leaf, in various plants. This layer consists usually of flattened cells, destitute, or nearly so, of colouring matter, but containing water, and serving as reservoirs for that fluid, the evaporation of which is prevented in many cases by the thickened wall of the exposed surface of the cell by the exudation of waxy matter, the presence of hairs, &c.

The *Gardeners' Chronicle* says:—"The existence on the roots of Peas, Beans, and Papilionaceæ generally, of small tubercles or nodules has long been known, and the growths in question have excited much attention on the part of botanists. It now appears probable that these little growths, which the purely practical man would deem of no importance, are of great consequence in connection with the absorption and digestion of nitrogeneous food, and the conversion of insoluble and inert nitrogenous matter into soluble food by means of minute organisms Such facts could never have been guessed by the most experienced practitioner in any length of time, and yet they are matters of cardinal importance to him."

The accounts of the trade and navigation of British India for the first eight months of the current financial year show that the value of merchandise imported, including Government stores, was Rs. 40,83,16,283, as compared with Rs. 35,72,48,375 for the same period of 1885. The value of the merchandise exported was Rs 55,29,53,828, as against Rs. 50,58,19,115. The value of treasure imported was Rs. 6,92,97,956, as against Rs. 10,12,41,462, and that of treasure exported Rs. 1,45,90,881, as against Rs. 72,73,180. The gross amount of import duty collected, including the salt duty, was Rs. 1,64,12,492, as against Rs. 1,48,10,190, and that of export duty collected Rs. 33,29,219, as against Rs. 37,76,074. The increase in both imports and exports was fairly general, there being few articles on which there is a decrease.

Consul Baker, of Buenos Ayres, reports that the wool season of 1885 86 in the Argentine Republic already exhibits a large deficit in the returns for the previous year. The reports for this season from October 1 to July 15 are 284,000 bales, against 315,000 for last year. The apparent shortage in the total wool clip is about 30,000 bales. The deficit in reality, however, is much larger than this, as every year heretofore there has been an average balance of 20,000 bales carried from one clip to the next, while this season there is no stock whatever on hand; so that the actual deficit is upward of 50,000 bales, equal to upward of 30,000,000 lbs. The prospect for the approaching wool clip (1886 87) is thought to be still more unpromising. The winter had been very severe on the flocks. The next clip, it is predicted, will be 75,000 bales, or 45,000,000 lbs below that of 1884-85.

Selections.

DR. AITCHISON ON PLANTS AND PLANT PRODUCTS OF AFGHANISTAN.

The third meeting of the session of the Pharmaceutical Society of Great Britain was held on Wednesday evening, the 8th December, 1886, there being a fair audience, including about a score of visitors and several country members, and as it ultimately proved, the programme was exceptionally interesting. Surgeon-Major Aitchison, who accompanied the Afghanistan Delimitation Commission as naturalist, came to tell the members of his experience in the region of the Hari Rud valley, which lies between the north-east of Afghanistan and the north-west of Persia. It is very seldom that a man of science has the opportunity of exploring that region; very few, if any, have done it before Dr. Aitchison, and he has done it so well—both botanically and zoologically—that few are likely to follow in his footsteps, unless to see with their own eyes the wonders which he speaks about. In his "Notes on some plants and plant products of Afghanistan," Dr. Aitchison settles many moot points which have been attached to the umbelliferous gum-resins since they were introduced into European medicine; he has brought home with him a most excellent collection of herbarium specimens, representing fully 800 species, all of them most complete in every part, and greatly enhanced in their value from the fact that his observations on the spot have added much to our knowledge of the life history of the plants. With the aid of a large map, Dr. Aitchison described the ground he went over, pointing out the regions where the more important plants—asafœtida, ammoniacum, and galbanum—were particularly abundant, and he was very happy occasionally in his by-remarks upon the tendency of the natives to mislead the investigator. For example, he was assured that asafœtida was obtained only from the female plant—"The only one which yields milk, you know." Another native tried to assure him that the plant was not the asafœtida-yielding one by eating slice after slice of the root apparently with great gusto. "You see," said the native, "it is not the asafœtida plant." "Bah!" said another, "you'll now stink like a camel for a

month." These are fair examples of the difficulties which the investigator had to meet, but as far as we could judge, Dr. Aitchison took the natives' statements for what they were worth. His description of the growth of the plants mentioned was very graphic, and it created no little astonishment in the audience when he showed an asafœtida stem about six inches in diameter, and explained that one month he had seen the plain upon which it grew arid and desolate and in three months it was thick with verdure, the *Dorema ammoniacum* and *Ferula fœtida* having grown to shrub-like size in that short period and given character to the plain by their foliage and beautiful inflorescence. A month later the barren aspect could be seen again. The mystery as to the origin of galbanum he satisfactorily solved with his specimens of the gum-resin and of the plant itself, and Mr. E. G. Baker's proximate analysis of the gum-resin would appear to establish with certainty that it is the true galbanum. The specimen was exceptionally fine, the tears were distinct pale-coloured, and generally more like ammoniacum, but the existence of umbelliferone in the resin was a conclusive proof of its identity. It is true that the indications of the presence of umbelliferone were somewhat remote, and not so marked as with old specimens; but we yet require some work on this gum, particularly in the direction of ascertaining if umbelliferone is present in recent samples to the same extent as in old ones. In the discussion which followed the botanists had it all to themselves, and it would certainly have been a very dreary affair had not the subjects under discussion long been enveloped in mystery. Mr. Baker, sen., in a very characteristic speech, referred to the value of Dr. Aitchison's work, and gave a very interesting account of the identification that afternoon of the source of royal salep, which Daniel Hanbury in 1856 recognised as different from common salep, derived from orchis species. Hanbury could never get to the bottom of this matter, but now it may be said with certainty that Mr. Baker, in conjunction with Mr. Helmsley, has proved that it is derived from an amaryllidaceous plant of which he showed a fresh specimen. This was the most interesting point brought out in the discussion; none of the speakers had ever been where Dr. Aitchison made his collection, so that they could not criticise, and therefore the speakers had to be content with the facts as stated, and they warmly expressed their thanks to Dr. Aitchison and their admiration of his work.

The President took the chair a few minutes past 8, and the minutes of last meeting being taken as read, he called upon Dr. Aitchison to read his

NOTES ON SOME PLANTS AND PLANT-PRODUCTS OF AFGHANISTAN.

After Dr. Aitchison had briefly referred to his appointment as naturalist to the commission and the work of the body, he described the route by which the company marched to the region where his investigations were chiefly made. That region was situated north and south between Herat and Panjdeh, to the west towards Persia, including the north-east corners of it, and to the east, including the north-west corner of Afghanistan. His attention was confined to plants which yield products of commercial value, and his work in this direction consisted of collecting botanical specimens as complete as possible, and at various stages of growth, also the ripe seeds for distribution to botanic gardens, such as Kew. He also endeavoured to obtain information as to local names and uses, but his difficulty in many cases was that there was no population from whom he could get that information. Umbelliferous plants are the characteristic type of the vegetation which abounds in the region. This may be on account of the peculiar situation of the plains, which are from 2,000 to 4,000 feet above the sea level. There is no surface water, and none can be got without digging to an enormous depth, yet, strange to say, plants grow on the soil in abundance during few months of the year. He graphically described a plain covered with vegetation of which the *Ferula fœtida*, *Dorema ammoniacum*, and *Ferula galbaniflua* were the principal individuals. The first two invariably grow together. From the time that the plants begin to grow the plains are one mass of green, then the stems begin to shoot up, and lastly a dreamland aspect is imparted to the scene on the appearance of the beautiful inflorescence. All this lasts from the end of April to the beginning of July, when it disappears as suddenly as it began.

Ferula Fœtida.—Dr Aitchison described this plant as an excellent one in fruit, and referred in detail to its growth. Regarding collection of the gum-resin, he explained that the natives stated that the plant does not yield asafœtida, but he humorously observed they have a faculty for telling travellers things which are very different from what can be seen by careful observation. The collectors come to the plains supplied with sufficient provisions to last them for several weeks. They lay bare the root stock before the flowering stage has been reached and cut off a portion of the stem, from which a milky juice exudes. Next the root is covered with a dome-like structure of earth and leaves, with an opening towards the north, so that the sun may not hinder the exudation. In five or six weeks they return, and by this time a thick gummy, reddish substance, resembling the asafœtida of commerce, has appeared on the root. This is scraped off and placed in a leather bag. The roots may yield a second supply, but not so abundantly as the first. The asafœtida is then sent to Herat, where it undergoes adulteration to fit it for commerce! Red clay being an important factor in this subsidiary industry. Dr. Aitchison stated that he had found another species of asafœtida yielding ferula in a different part of the country (Beloochistan), which was distinct from the true Ferula fœtida.

Dorema Ammoniacum.—This grows along with, and as abundantly as, Ferula asafœtida, and in the young state it is scarcely possible to distinguish them, both yielding a juice; but as they grow older, the dorema stem begins to show its characteristic feature—large swellings in the side. It also recognisable from the inflorescence, which is different. When at the fruiting stage the plant is attacked by insects, which puncture the stem, from the wounds a juice flows out, which soon concretes. This is ammoniacum. The author had also observed another ammoniacum plant in abundance, *viz.* Dorema glabrum.

Ferula Galbaniflua.—The galbanum plant was described minutely, as no previous description of it is wholly correct. After referring to the amplification which is required upon Bentley and Trimen's description of the plant, he stated that it grows very abundantly in the Gulran vicinity. In the young stage the stem has a beautiful semi opalescent appearance, and as it grows older it is vividly marked with rainbow colours. From an early stage of its growth, it yields by puncture a milky juice which very slowly concretes. This is galbanum. It has a celery odour, and is very adhesive, so that when removed, it generally takes some of the stem with it. This is collected and sent to India, where it is largely used by the natives.

The next plant referred to was described as the sumbul plant, which has been identified as *Ferula sauveolus.* It is new to botanists, and we gather that it is the source of the sumbul root of commerce. After reference to some other umbelliferous plants of minor importance, Dr Aitchison proceeded to describe three new kinds of *manna.* The first is from *Cotoneaster acutifolia*, a tall shrub growing on the hills in thickets. As the plants ripens, the branches become covered, with the exudations which is removed by simply shaking the branches and collecting the manna in a cloth as it falls. A second kind, grown in the vicinity of Rui Khaf, is also new, and the third is obtained from *Tamarix gallica*, not *T. mannifera.* He obtained another specimen from *Salsola Fœtida* in fine tear-like masses, but that had been lost.

The next plant of importance which was described was *Glycyrrhiza glabra.* This is largely collected and is converted into black liquorice by the inhabitants of Turkistan. In the preparation whey is used, this imparting to the extract a peculiar piquancy which is not obtainable by water alone. Liquorice is also largely imported into the country from Persia.

Two species of astragalus which yield a tragacanth-like gum were then referred to. This is a peculiar form which exudes spontaneously, and Dr. Aitchison found on cutting a stem that the juice proceeded from the medullary space. It is collected and exported to India, where it is used chiefly for stiffening fabrics. A species of rhubarb known to the natives as "fool's rhubarb" was found near the Barkut mountains. The root of this is used by natives as medicine. Specimens were shown, and it was stated that some seeds of the plant had been sewn at Kew, and plants were now growing from them, so that their indentification is approaching. Amongst the other plants referred to were *Micarinda spinosa*, the root of which was one of the most nauseous and intolerable smelling substances which he had ever come across. *Astragalus Heratensis*, the source of anzeroot, or sarcocalla, hitherto undermined and *Delphinium zatil*, which yields flowers largely used as a yellow dye stuff in India, the source of which has hitherto been unknown.

After Dr Aitchison concluded reading his paper, he was heartily applauded, and the President called upon Mr. E. G. Baker to read a note on a sample of Afghanistan Galbanum collected from *Ferula galbaniflua.*

This being Mr Baker's first appearance as an original worker, he received a special round of applause. His analysis of the gum resin brought home by Dr. Aitchison, gave the following results from 5 grammes of the powdered material:—

	Per cent.
Petroleum ether extract	... 3·108
Ether extract	... 61·200
Alcohol extract	... 7·570
Water extract	... 17·028
Insoluble matter	... 10·500
Ash	... 2·463
Volatile oil and moisture	... 5·332

The water soluble matter, chiefly gum, gave a precipitate with ammonium oxalate and lead acetate, but not with borax. The ash was found to contain sodium and calcium as carbonates, and spectroscopic examination gave a faint indication of storontium. The resin gave a dark-brown colour with sulphuric acid, none with hydrochloric acid in the cold, but a dirty red on boiling, without change on the addition of alcohol. The umbelliferone reaction was obtained with ammonia, and sulphur was proved to be absent. On comparing it with museum specimens, he found some points of identity, but there were also points of difference, and on applying Hirschonn's test for Persian galbanum, it did not satisfactorily respond to it, and his remarks appeared to indicate that Hirschonn's test require revisal

Dr. Trimen was then called upon by the president. He commenced by referring in warm terms to the service which Dr Aitchison had rendered to botanical science by his painstaking and laborious investigations. He was especially pleased that Dr. Aitchison had brought home such a complete set of material and having himself some years ago worked on umbelliferous plants, he knew how much material for the proper illustration of certain members of the order was required. He then referred to points of difference between some of the plants as brought home by Dr. Aitchison, and the description given of the same in "Medicinal Plants," referring more especially to ammoniacum and galbanum. To a question regarding the frontier of Persia and Afghanistan, Dr. Aitchison replied that the same question had been put by the Shah of Persia to one of his ministers, After some time the reply was "I refer you to the British." remarks regarding the region where the umbelliferous plants grow, Dr. Trimen concluded by again complimenting Dr. Aitchison on his excellent work.

Mr. J. J. Baker (Kew), the next speaker, made a very acceptable speech. He stated that his Afghanistan work was but a small portion of what had been done by Dr Aitchison for botanical science, and referred to his note book of the flora of the Punjab. This was done twenty years ago. During the last Afghan war he had

worked up the flora of that country, and now he had thoroughly investigated the region which connects the three great divisions of Asiatic flora. These were the Indian —extensive and rich flora comprising about 15,000 different species; the Siberian, also an extensive and most characteristic flora; and the Oriental which was rich, and contained most peculiar species. All those seemed to be concentrated in the spot explored by Aitchison. He gave the audience a graphic account of the extent of Dr. Aitchison's work, which comprised zoology as well as botany, and then made his statement regarding royal salep, which first received attention from Hanbury, thirty years ago, and pointed out then in a paper (reprinted in Science Papers) that the royal salep partook more of the character of a bulb than a tuber. But he could not get at its origin, although he made repeated inquiries. A sample of this royal salep brought home by Aitchison was shown which presented the characteristic nucleus, or clove, peculiar to tubers. He contrasted this with Hanbury's figure, and showed them to be identical. Lindley had thought that the royal salep was obtained from some species of tulip, but Mr. Baker said it was nothing like it, and only that afternoon he along with Mr. Helmsley, Oliver, and Johnston, had been able to refer it *Unguernia tris phera*, belonging to the natural order amaryllidaceæ. He showed a fresh specimen of the bulb of this plant, and described it botanically. This discovery removes royal salep entirely from the other saleps, and it would appear that it is more like those which grow in Central Africa, and which are used by the Kaffirs. The subject is still being worked up by Mr Johnston, at the Kew laboratories. Messrs. Hemsley, Jackson, Bentley, and Holmes also spoke, but their remarks were mainly complimentary to Dr. Aitchison, and nothing new was added to the knowledge which was conveyed in the papers read. The President then formally put a vote of thanks to Dr. Aitchison and Mr. Baker to the meeting, and it was carried with acclamation.—*Chemist and Druggist.*

THE MANURIAL VALUE OF BASIC CINDER.

I.

BY PROF. FREAM, B.SC. LOND., F. L. S., F. G. S.

ONE of the grandest triumphs of Agriculture is to have shown how waste materials, apparently worthless, may nevertheless be utilised on the profitable growth of plants and animals. Not in one case only, but in many cases, the recognition and subsequent application of this fact have determined, in effect, the profitable prosecution of an industry which otherwise could only have been carried on with financial results the reverse of encouraging. It has been said that in the economy of nature nothing is lost, and the history of modern chemical technology teems with illustrations of the fact, that the true economy of many industrial processes is only to be arrived at through the co-operation of the tiller of the soil. The latest example of this intertwining of agricultural and manufacturing art is one likely to be fraught with no ordinary consequences.

Outside the works, where, by means of Bessemer converters, coarse pig-iron is modified into still, huge piles of slag, or basic cinder, have for years been allowed to accumulate, making the never too charming surroundings additionally hideous. There was no market for the material, even as mineral rubbish, and if there were, the cost of transport would have been prohibitive. And of these vast heaps must, and would have continued increasing in size were it not that the art of agriculture rests on a scientific basis, and thus that its votaries are ever on the look-out for means of adding to its resources. A knowledge of the fact that one great object aimed at in the manufacture of steel is the elimination of phosphorus led to the suspicion that the store of this element, contained in the refuse slag, might be rendered available as plant food. Experiment alone could verify this hypotheses and experiment has, as I now proceed to show, amply and unerringly demonstrated the high manurial value of this hitherto worthless rubbish.

On the farm belonging to the College of Agriculture, near Downton, Wilts, experiments were made in the summer of last year with a view of testing, as thoroughly as possible what manurial value was possessed by 'ground basic steel slag or cinder,' and by 'precipitated phosphate of lime prepared from basic cinder,' as compared with such standard phosphatic manures as 'mineral superphosphate or soluble phosphate of lime,' and 'ground coprolites or undissolved mineral phosphate of lime.' The field in which the experiments were made carried a light, thin soil, very abundantly supplied with lime, and its cropping during the preceding nine years had been as follows:—1, Wheat; 2, oats and barley; 3, vetches, followed by late turnips, 4, early turnips; 5, wheat; 6, seeds, mown and fed; 7, do.; 8, wheat; 9, barley. Inasmuch as the field was unusually free from the effects of previous manuring, and had been somewhat heavily cropped in recent years it was in a condition admirably suited for experiments, and might be expected to show decided results with the various manures employed. Passing over the details of cultivation, it is only necessary to mention that the plots were one chain square, so that each occupied 1-10th of an acre, and each carried 40 drills or rows of plants. The whole series of experiments was simultaneously carried out in duplicate at Ferryhill, Durham on a deep, stiff clay, almost destitute of lime—such a soil as might easily be paralleled at scores of localities in Scotland—and one that had received no manure of far several years. At Downton the crop employed was swedes; at Ferryhill, Aberdeen yellow turnips; whilst the manures sown at the latter station were portions of the same parcels as were used upon the corresponding plots at Downton.

Two classes of basic cinder preparations were employed, and the percentages of their important ingredients were as follows, A being raw ground basic cinder, and B being precipitated phosphate made by Scheibler's process from basic cinder:—

	A.	B.
Lime	41·54	29 91
Protoxide of iron	14 66	Trace.
Peroxide of iron	8·64	3·62
Phosphoric acid	14 32	30·89

Of the other manures, against which the basic cinder was, as it were, to be pitted, the superphosphate was an ordinary sample freshly made, and guaranteed 26 to 28 per cent. 'soluble phosphate' its analysis gave 26·2 per cent, 'soluble phosphate'(= 12 per cent phosphoric acid). The rich superphosphate employed (Curacoa super) was guaranteed 44·45 per cent 'soluble phosphate and yielded on analysis 44 per cent(= 20·1 per cent phosphoric acid), The ground Cambridge coprolites contained 55 per cent tricalcic phosphate (=25·1 per cent, phosphoric acid).

The plots were so arranged that every manured plot was adjacent to an unmanured plot, thus providing for fairness in comparison. Without quoting the actual yields it may be stated that the very considerable manurial value of raw ground basic cinder was evidenced by the superior crop on the cinder dressed plots as compared with the unmanured plots. At Downton the crop was more than doubled by an application at the rate of about ½ ton per acre whilst at Ferryhill the crop was more than quadrupled. These increases of over 3 tons per acre Downtown and 5¼ tons per acre (Ferryhill obtained at the cost of ¼ ton of cinder represent a money value of 21*s*. and 36*s*. 6*d*. respectively per acre, if its crop is priced at only 7*s*. per ton.

Comparing the basic cinder with other sources of phosphorous it appears that on chalk soils 4 cwt. basic cinder per acre in inferior to an equal weight of mineral superphosphate; on clay soils it is equal or superior to it: whilst on both soils it is superior to an equal weight of coprolites. The fact that ground cinder, containing only 14·3 per cent phosphoric acid, produces better results than an equal weight of ground coprolites, containing 25·1 per cent phosphoric acid, points to the conclusion that the phosphates in the cinder are more soluble and more easily assimilable by plants than is mineral phosphate of lime in the form of ground coprolites. On such soils as at Ferryhill, cinder even competes successfully with an equal weight of superphosphate, containing 72 per cent of phosphoric acid soluble in water. Again it is established that precipated phosphoric acid is superior to the undissolved phosphoric acid of cinder and greatly superior to the undissolved phosphoric acid of coprolites, on light chalky soils; on clay soils, whilst the superiority is still evident, the three forms of phosphoric acid tend to approximate in value.

The following table enumerates the different cinder preparations, and indicates the weight of phosphoric acid per acre in each application; it also shows the actual increase upon 1·5th acre as compared with the unmanured yield upon an equal area:—

PER 1-10TH ACRE PLOT.	Equi[illegible] per acre.	P[illegible] acid [illegible]	Increase over unmanured yield on two 1-10th acre plots (=1·5th acre). Ferryhill. Cw.	Qrs.	Lbs.	Downton. Cwt.	Qrs.	Lbs.
		Lbs.						
45 lbs. Raw cinder ..	4 cwt.	64½	22	8	9	0	1	21
2. 45 „ Cinder, dissolved by sulphuric acid	4 cwt. cinder	64½	12	0	8	8	1	18
45 „ Cinder, half raw, half dissolved.	4 cwt. cinder	64½	17	3	18	2	1	6
45 „ Cinder quarter raw, three-quarters dissolved	4 cwt. cinder	64½	8 (decrease)	0	8	0	3	20
78¾ „ Raw cinder ..	7 cwt.	112	20	1	15	5	8	21
2 cwt. Raw cinder ..	20 cwt.	820	24	2	0	21	1	26
17 lbs. Precipated phosphate.	170 lbs.	58	17	0	15	8	0	24
			21	1	8	12	2	8
85lbs. precipitated phospate	850 lbs.	109	Produced an increase over the crops grown with 28 lbs rich superphosphate alone of—					
11¼ „ Raw cinder, mixed with 28 lbs. Rich super.	1 cwt. cinder		5	1	23	1	1	16

An examination of this table shows that on the Ferryhill soil the best dressing all things considered, was (No I,) 4 cwt. raw ground cinder per acre; no increase on this quantity of cinder produced anything like a corresponding increase of crop. At Downton the indications are obviously in favour of a heavy dressing of raw ground cinder, say (No. 6), from 10 to 20 cwt., per acre. Weight for weight, the precipitated phosphate is perhaps three times as efficacious as the basic cinder, as it is estimated it would have taken at least 6 cwt. precipitated phosphate to produce the large crop grown with 20 cwt. cinder. In the dressing No. 9, the raw cinder, has produced fully its proportionate effect, and such a mixture might no doubt be more generally depended upon than raw cinder alone.

II.

BESIDES raw cinder it will be seen that there were also employed mixtures of superphosphates and raw cinder mixtures of raw and dissolved cinder and dissolved cinder alone. Of these the last named is of greatest interest. The primary objection to using basic cinder as a source of superphosphates lies in its large per centage of oxide of iron—particularly the protoxide, or ferrous oxide. The sulphuric acid employed in making the superphosphate converts this oxide of iron into sulphate of iron popularly known as green vitriol, and hitherto regarded as poisonous to vegetation. A soil sterile from the presence of sulphate of iron yielded on analysis only 0·7 per cent of that substance. If the

soil were only 5 inches deep this percentage would be equivalent to about 4 tons sulphate of iron per acre; but it does not follow, from the sterility of this particular soil that an application of ½ cwt, or even 1 cwt. per acre of sulphate of iron in manure would cause the least damage to the crop. Used in this way sulphate of iron does not persist in the soil for it is very rapidly oxidised and decomposed, so that any influence good or otherwise which it might have is probably exercised within a short time of its ... considerations, some of the raw ...

resulting product termed 'dissolved cinder or phosphate' gave on analysis, the following results:—

Moisture expelled at 206 degs. F.	24·71
Protoxide of iron soluble in water ... ... (=11·53 crystallised green vitriol).	2·81
Phosphoric acid (P_2O_5) soluble in water	4·28
" " soluble in ammonium citrate ...	0 61
" " insoluble	0·03
Lime	14·90
Sulphuric acid (SO_3)	33 34
Silica and insoluble matter	4 00
Water not expelled at 205 degs, F., magnesia, peroxide of iron, alumina, &c	15·34
	100 00

The total phosphoric acid, 4·90 per cent., is equivalent to 10·70 tricalcic phosphate. The following table shows manures applied, and the results on two 1-10th acre plots (=1·5th acre):—

Per 1·10th Acre Plot,	Increase over no Manure. At Ferryhill. Cwt.	Qr.	Lb	At Downton. Cwt.	Qr.	Lb.
1. 54 lbs. Supherphosphate ...	27	3	20	18	1	16
2. Ditto, plus + 13½ lbs. green vitriol,	19	2	11	7	1	7
3. 45 lbs. Dissolved cinder ...	12	0	23	3	1	13
	Decrease under no Manure.					
4. 22½ lbs. Green vitriol alone ...	0	3	10	2	3	14

Hence, 2 cwt. green vitriol alone per acre No. (4) decidedly injured the crops whilst 135 lbs, green vitriol per acre (No 2) in dissolved cinder also injured the crop—that is to say, it partially counteracted the beneficial influence of the associated phosphoric acid, compare with (No) The dissolved cinder, nevertheless, possesses a positive manurial value in spite of its sulphate of iron, though the latter is injurious when used to the extent above indicated. A smaller quantity of sulphate of iron (say ½ cwt. per acre) might not only have been not injurious but even beneficial. Recent researches, indeed, lead to the conclusion that ½ cwt. per acre green vitriol is beneficial. A trial of manures made by dissolving a suitable mixture of basic cinder and ground coprolites or other mineral phosphate, is recommended.

Further experiment made to test the germination and growth of farm seed in various mixtures of garden soil and basic cinder have yielded some significant results. Although one ton per acre may seem a large dressing of artificial manure it really forms but an insignificant fraction of the soil with which it becomes incorporated. An acre of arable soil 12 inches deep would weigh from 1 500 to 2,000 tons, and one ton of basic cinder distributed amongst all this constitutes only 0·5 to 0·6 per cent. of the mixture, so that as many as 100 dressings of one ton per would be required to bring the proportion up to 5 or 6 per cent. In the experiments now to be noticed, the smallest proportion used was double that which would result from mixing 100 dressings of one ton per acre with ordinary arable soil 12 inches deep. The mixtures actually employed were:—

1. Pure basic cinder.
2. Basic cinder, 50 p c.; garden soil, 50 p.c.
3. Basic cinder, 25 p.c.; garden soil, 75 p.c
4. Basic cinder, 10 p c.; garden soil, 90 p.c.
5. Garden soil alone.

Flower pots were filled with 1 lb. each of these prepared soils, sown with various seeds, and placed under the ordinary conditions which promote germination. Of barley, one or more seeds germinated all the pots. Even in the pure cinder one seed germinated and grew to a height of 3 or 4 inches eventually dying from lack of nitrogen in the soil All the other pots yielded good plants of barley, those in the mixture of equal weights of soil and cinder being actually the best, whilst the ripe grains of the plants it produced germinated freely in moist earth. Of turnips one or more seeds germinated in all the pots, and one seed even in the pure cinder. The same is true of the clover seeds employed. White mustard germinated in all excepting the pure cinder. Of garden cress, one seed germinated in the pure cinder whilst all the other mixtures yielded one or more plants which flowered and seeded. These results prove incontestably that the lower oxide of iron (the protoxide of iron, or ferrous oxide), which is present to the extent of about 14 per cent. in ordinary samples of basic cinder, is in no way inimical to plant life. Roughly speaking, two-thirds of all the seeds sown in the garden soil germinated, and one half of those sown in mixtures 2, 3 and 4. That the overwhelming proportion of basic cinder in mixtures, 1, 2, and 3—proportions which would never be even approached in practice—was not without some effect, is explained by the fact that basic cinder is an alkaline substance containing free lime, which is well known to be detrimental to germination. On the other hand, there are very few of the ordinary artificial manures that would not be absolutely fatal to germination even if employed in the smallest proportion in which the basic cinder was tried, viz to the extent of 10 per cent. Ground coprolites would stand this test, and perhaps bone meal; but lime, soot, Peruvian guano, nitrate of soda, sulphate of ammonia, superphosphate of lime, and kainite, are all fatal to vegetation when employed in quantities of much less than 10 per cent. of the soil to which they are added.

The field experiments at Downton and Ferryhill were carried out by my colleagues, Prof. Wrightson and Dr. J. M. H. Munro. The experiments on seeds and the chemical analyses were made by Dr. Munro, who is the patentee of the 'dissolved cinder.' Further field trials are in progress this season, and, so far as the eye can judge, the results will be highly satisfactory and quite confirmatory of last year's; but the test of the weighing machine has yet to be applied. The basic cinder employed in all these experiments was produced at the works of the North Eastern Steel Company Limited, Middles Borough-on-Tees.

The high commercial importance of the results which have been established has been the means of inducing other investigators to enter the field. In Germany, Belgium, France, Scotland, and elsewhere, this refuse of steel work is being put to the test, and everywhere with gratifying results. Dr. Moritz Fletcher, in a recent number of *Biedermann's Centralblatt*, entirely confirms the main result established at Downton, *viz.* that the phosphoric acid of basic cinder is much more easily assimilated by plants than the phosphoric acid in ground mineral phosphates, such as apatites and coprolites, and as regards efficiency is more nearly akin to precipitated phosphoric acid. The easy solubility of cinder phosphate in the organic acids is an important factor in this direction. Wagner of Darmstadt Fittbogen of Dahme, Albert of Biebrich am Rhein and Orban of Liege, have all contributed results confirmatory of those established at Downton. So significant were these latter regarded in France that Prof. Grandeau, himself a distinguished agricultural chemist, translated in full the teachnical report of the Downton and Ferryhill experiments for one of the leading French daily papers, *Le Temps*.

It is now established that the basic cinder, when reduced by grinding to the finest possible condition is more quickly effective than ground coprolites, or even than ground bones and is to be preferred in sandy and clayey soils poor in lime: in wet, sour, or mossy meadows; and in clover fields. Whilst the dissolved cinder is specially efficacious on certain soils, it remains to be seen whether the general treatment with sulphuric acid will prove commercially as profitable as the use of the finely ground cinder. German buyers, it is reported, have already appeared in Britain, with the object of buying up all the basic slag they can find available, so that what has hitherto contributed to unsightly rubbish heaps may in time shew itself forth in fertile fields and verdant pastures.

This latest example of the utilisation of waste products has at once an agricultural and a metallurgical interest, a scientific and a commercial importance, by the combustion in the converter of the phosphorus of pig iron, in presence of lime, hundreds of thousands of tons of phosphate of lime are produced, constituting 40 per cent of the weight of the old converter linings. These discarded converter linings form the basic cinder which has now been demonstrated to possess a high manurial value. And thus the blast furnace, whose lurid flames light up with unearthly glare the land escape from which its poisonous fumes have removed the vegetation offers a compensation erstwhile little *suspected*; for the converter which produces the steel, yields, at the same time, a bye-product which, by the farmer's art, may be utilised in the production of corn and milk, meat and wool. Truly, in the economy of nature, nothing is lost.—*North British Agriculturist.*

THE ACTION OF NITRATE OF SODA.

JOSEPH HARRIS.

THE discovery that all nitrogenous matter must be converted into nitric acid before our cultivated plants can use it, has thrown much light on many questions which have hitherto perplexed the farmer, the fruit-grower, the gardener and the chemist. It may be well, therefore, to state briefly a few of the well ascertained facts bearing on this matter:

1st.—A soil containing much organic matter, such as decaying leaves weeds, roots, grass, and clover manure, will hold much more water than a soil from this organic matter has been removed by years of cultivation. On the field at Rothamsted, where wheat has been grown for over forty years, with and without manure, the different plots have an underdrain running beneath them. The drains are so constructed that the number of the runnings can be seen and samples of the water taken for analysis. One plot has had fourteen tons of manure applied to it every year, while the plot adjoining has had no manure of any kind applied. Both plots have been sown to wheat every year for forty years. The plots lie side by side. For fifty years (1867 1881) a record has been kept of the number of days that the drains discharged water. During the fifteen years, the total number of days on which the drain ran were as follows: From April to September, inclusive, manured plot, ten days; no manure plot, forty-nine days. From October to March inclusive, manured plot, sixty-two days; no manure plot, one hundred and seventy-eight days The amount of water contained in the soil to the depth of three feet, when thoroughly saturated in the winter, was: No manure plot, 1,396 tons; manured plot, 1,610 tons. In other words, the plot containing much organic matter was capable of holding 214 tons (479,360 pounds) more water per acre than the plot without manure.

2nd.—Nitrogen is the most costly ingredient of plant food or manure. When there is no deficiency of other ingredients, such as phosphoric acid, potash, lime, etc., the yield of many of our most important crops, within the limits of the season, is in proportion to the amount of nitrogen in an available condition, furnished by the soil or manure.

3rd.—The nitrogen in grain, straw, clover, roots and other organic matter is combined with carbon, and cannot be taken up by our

ordinary cultivated plants until it is decomposed and converted into nitric acid.

4th.—The organic matter of the soil, when free from roots and leaves and other fresh or partially decayed matter, contains less carbon, and, consequently, a higher percentage of nitrogen than the fresh organic matter.

5th.—Grass-land, like the prairies of the West, gets richer in nitrogen in the first nine inches of surface soil from the partial decay of grass and roots.

6th.—When this soil is ploughed and exposed to the atmosphere, the nitrogenous organic matter is converted into nitric acid. The nitric acid unites with the lime of the soil. This nitrate of lime is very soluble in water, and if the plants do not take it up, it leaches into the porous subsoil or under-drains, or passes off in the surface drainage.

7th.—It is almost impossible to keep land free from vegetation. Grass and weeds spring up wherever there is food for them, and keep the nitrate from running to waste. They convert the soluble nitrate into insoluble organic matter, and it may be many years, or even many centuries, before this organic matter is converted back into soluble nitrate.

8th.—The object of agriculture is to convert the organic matter into soluble nitrate, and use it for the production of valuable crops.

9th.—The most vigorous plants get the lion's share of nitrate and other food, and weeds are more vigorous than our valuable plants.

10th.—It is only recently that we have discovered how the insoluble organic matter of the soil, and roots and vegetable matter and manure, are converted into soluble nitric acid. The change is effected through the action of a minute living plant. This plant can grow only when the soil is warm and moist and in the presence of air and lime, or potash, or soda, or other base. If the soil is too wet or too cold, its growth stops, and no nitrate is formed

11th.—During the warm weather in June, July and August, if the soil is moist and exposed to the atmosphere by ploughing and cultivating, the growth of this minute plant is rapid, and much nitrate is formed.

12th.—If the soil is under crop, or weeds are allowed to grow, the nitrate is taken up by the plants and converted back into organic matter. If the land is fallow, the nitrate lies in the soil ready for any crop we may sow (winter wheat or rye, for instance) in the fall. If we sow nothing, and no weeds are allowed to grow, we run considerable risk that the nitrate may be washed out of the soil by the rains of winter or early spring.

13th.—Summer-fallowing, if the land is not sown in the fall is a wasteful process. The nitrates formed in the moist soil during summer would, in many sections, be leached out of the soil in winter.

14th.—Fall-ploughing, if followed by warm weather and an open, wet winter, would be likely to entail a similar, though smaller, loss.

15th.—If there was no leaching during winter or early spring, fall-ploughing would be very beneficial.

16th.—In the North-west, where the land is frozen solid all winter, summer following or fall ploughing would be attended with great benefit, and little or no loss, while in sections where the winters are mild and wet, the same practice might entail much loss of nitrates Good crops might be obtained, but the soil would get rapidly poorer.

17th.—With our represent knowledge, it is not easy to understand how crops which require considerable nitrate early in the spring, are enabled to get it. We can see how they get it in the North-west or in any section where there is no drainage during the winter or early spring. The nitrates formed during the warm weather of the previous summer and autumn are retained in the soil. But in sections where the nitrates are liable to be washed out, how are early crops to get their nitrogen?

18th.—We get nitrate in properly managed barnyard or stable manure, but at the best, only a comparatively small quantity, and if we depend on this manure, it will be necessary for early crops to apply an excessive quantity The nitrogen is in the manure, well as in the organic matter of the soil also, but it will not be converted into nitrate until the soil is warm enough for the plant which produces the change to grow.

19th.—It is for this reason that I think it probable that an application of nitrate to our peach trees early in the spring may prove very beneficial.

20th.—It is a well-known fact that gardeners apply large quanti ties of manure to all crops that they wish to "force" early in the spring in the open air. If they would try nitrate of soda, or nitrate of potash (common saltpetre), they would not need to use such an excessive quantity of manure.

In regard to the question "How are early crops to get their nitrates in the spring" there is one new fact stated by Lawes and Gilbert that should not be overlooked.

The field on which beans had been grown for many years, with different manures, got foul and was summer-fallowed for four years in succession. On the 9th of April, 1883, samples of the soils were analysed. On the plot which had received no manure, the amount of nitrogen per acre to the depth of nine inches, in the form of nitric acid, was four and a half pounds. Where minerals and ammonia, or nitrate of soda had been used, there was, in the same depth, not quite three and a half pounds; but where farm-yard manure had been used, there was a little over thirteen and a half pounds of nitrogen, in the form of nitric acid. During the previous autumn and winter there had been a great excess of both rain and drainage," and yet the manured land contained as much nitric acid as is contained in ninety pounds of nitrate of soda, while where no manure had been used, or where artificial manures had been used, there was only one-fourth as much.

When I wrote the 17th paragraph above, I was not aware of this fact. It shows that we can get nitric acid in the soil for early crops in the spring by previously manuring the land, not with artificial fertilizers, but by the use of common manure. But if we want to provide enough for the use of plants early in the spring, we have to use the manure in excessive quantity. The practical conclusion is, that the gardener especially, must attempt to dispense with the use of stable manure, but you can get as good results at much less cost by using a smaller quantity of manure and furnishing the desired nitrogen in the form of nitrate of soda or saltpetre. The reason why the nitrate is more completely washed out of the soil where no farm-yard manure had been used, is owing to the fact that a soil containing a good quantity of manure or other organic matter holds more water, and this water holds the nitrates.

Practical farmers and gardeners have always insisted on the importance of keeping the soil well furnished with organic matter, either by ploughing under sod or green crops, or by the application of manure, while the fact that Lawes and Gilbert have grown large crops of wheat every year in succession for over forty years by the use of artificial fertilizers, and also large crops of barley, beets and pototoes in the same way; and the additional fact that Mr. Prout could carry on a large farm and grow large crops without keeping any stock or making any manure—selling the crops of grain, roots and hay by auction every year while growing—all these facts, and many similar ones were supposed to show that there was no necessity of furnishing organic matter to the soil. Villes' book, "High Farming without Manure," embodied and advocated this doctrine. In one sense it is true. But all the more recent facts seem to show that practical farmers and gardeners were right. We should aim to keep up the supply of organic matter in the soil.—*American Agriculturist.*

THE VALUE OF FRUIT AS FOOD.

Few people are aware of the value of fruit as an article of food. Many persons look on fruit as a luxury, whilst some shudder at the idea of it, and conjure up internal tortures at the name. Children, on the contrary, will eat fruit at any time and undergo much discomfort to get it. It is elderly people, or those past their first youth who cannot eat fruit and enjoy it. Cooked foods, highly seasoned meats, and alcoholic liquors have spoiled their taste, and in many instances a ripe strawberry or plum would inconvenience them sadly. But the person who values health, and who knows a little of the value of fruit, will make it a point to eat it daily, and even on occasions to make a meal almost entirely of it. Another cause why ripe and wholesome fruits are given a bad name is because they are eaten at the wrong end of the meal. After many courses of heavy food and strong drinks, a few harmless strawberries are indulged in, and then when these rich foods and stimulating drinks upset the stomach, the blame is put on the innocent strawberry. The real place for fruit is at the beginning of a feast and not at the end. A better plan still is to make a meal of bread and ripe fruit The best meals to make thus are breakfast, lunch, or early tea. The bread should be brown and dry, and the fruit ripe and raw. Dry brown bread cleanses the tongue and brings out the flavour of the fruit. Butter on the bread would give its own flavour, or even the salt in the butter would destroy the pure taste of the fruit.

Many people, a good number of whom the doctors, are of the opinion that autumnal diarrhœa is due to fruit. This is an idea not borne out by facts. I inquired into the subject, and found that in every case the diarrhœa was due to meat or fish, but never to fruit alone. I have experimented on myself, and got other friends to test the result of free fruit-eating on themselves, but in no case as yet have I got a report of diarrhœa from it. I lived one day last summer on strawberries, managing to eat seven pounds during the day, but I had no diarrhœa. Other times I have lived on plums and milk, and have eaten freely of cherries and other fruits in their seasons, but never had looseness of the bowels in consequence. The true explanation of autumnal diarrhœa lies in the fact that in hot weather flesh putrifies very quickly. during putrefaction alkaloids called ptomaines are formed; these are emetic and purgative; and give rise to distressing symptoms. These alkaloids are found in meat at all times, but more especially during hot weather.

Fruit has the composition of a perfect food, containing all the substances required by the body. Here is the composition of strawberries:—

	per cent.
Water	87
Sugar	4
Free Acid	1¼
Nitrogen	¾
Insoluble matter (½ per cent of which is ash) ...	7
	100

From this table we can see that fruit is a perfect food, as it contains everything needed, including water.

Were fruits used daily by all, there would be less gout, rheumatism, gall stones, stone in the bladder, and calcareous degeneration than there is now. In connection with the curative power of fruit, we must mention the "Grape cure." This is practised in France and Germany in the autumn, and is a cure for many diseases due to high feeding. The patient is given a pound of grapes to eat the first day. This amount is added to until the person can eat five or six pounds a day. The other food is gradually lessened, and the diet at last consists entirely of grapes. It cures obesity and many other complaints, and starts the person off on a new lease of life. In this country we may partly carry out this cure, using strawberries, gooseberries, cherries and plums in place of grapes. Fruit is thus seen to be a necessity in a rational diet, and of immense value in dietetic medicine.—*Vick's Magazine* for October.

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THE

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A WEEKLY

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VOL. XII.] CALCUTTA :—SATURDAY, JANUARY 29, 1887. [No. 5.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 19TH JANUARY 1887.]

Madras.—**General prospects good.**

Bombay.—**Slight rain in parts of Sind, Gujarat and Khandesh : other conditions unchanged. Fever in parts of twelve, cattle-disease in parts of ten, and small-pox in parts of two districts.**

Bengal.—**Rain reported in Behar and Chota Nagpore and in parts of Moorshedabad and Dinagepore. It has been generally very beneficial to *rabi* crops, but it is stated to have been injurious to poppy in Mozufferpore, Gya, Shahabad and Hazaribagh. *Amun* harvest is nearly finished with good outturn. Public health is generally fair, fever and cholera having abated.**

N.-W. P. and Oudh.—**Rainfall has been general in the Provinces, and crops have benefited thereby. Hail has fallen in some places. The cloudy weather which prevailed during the week has caused blight to crops in a few districts. Prospects continue, however, to be favourable. Markets are fully supplied and prices fairly steady. Public health good. Slight cattle-disease reported.**

Punjab.—**Rain has fallen in all districts except Hissar and Shahpur, and is wanted in the Hissar, Shahpur and Peshawar districts. General health good. Small-pox among sheep in tahsil Khushab and Shapur district. Prices rising in Hissar, Umballa, Rawalpindi and Peshawar, fluctuating in Delhi and Mooltan; elsewhere stationary. *Rabi* prospects good, except in Shahpur where crops are suffering from want of rain.**

Central Provinces.—**There has been heavy rain in the Northern districts which is likely to damage *rabi* crops. Weather elsewhere seasonable and prospects good. Fever in places. Prices generally steady.**

British Burmah.—**Week rainless. A few cases of cholera in four, and slight fever in one district. A little cattle-disease in one district. Harvest generally well advanced.**

Assam.—**Weather cloudy and windy. Some rain has fallen in three divisions. Reaping of *sali* almost finished. Gathering of mustard commenced. Insects have done some damage to mustard and linseed in south Sylhet, otherwise state and prospects of the crops good. General health good. Prices steady.**

Mysore and Coorg.—**In parts of the Tumkur district the paddy crop is reported to be affected by blight, elsewhere standing crops in good condition. Prospects of season continue favourable. Harvesting of coffee and rice in progress. Public health good. No material change in prices.**

Berar and Hyderabad.—**Weather clear. Threshing of *kharif* crops approaching completion. *Rabi* prospects good. Threshing of *jowari* in progress. Weeding of *rabi* crop continues. Fever prevails in a slight form ; cattle-disease also prevalent. Prices steady.**

Central India States.—**Rain has fallen generally. Weather seasonable. Agricultural prospects good. Crops flourishing. Opium doing well. Health good. Prices show a tendency to rise.**

Rajpootana.—**Weather cloudy. Rain and hail have been pretty general. Crop prospects favorable, improved in Bhurtpore. Tanks drying in Dholpore and Sirohi. Small-pox still prevalent at Jhallawar, otherwise public health good. Prices fluctuating.**

Nepal.—**Prospects fair. Prices still high.**

Letters to the Editor.

THE MANGO-BORER.

TO THE EDITOR.

SIR,—Will you be good enough to give me some information with regard to the prevention of the Mango-borer. I have seen your correspondent, "Rust's" letter, in your issue of the 16th January 1886, and as I am anxious to try his recipe, I should like very much to have some further information on the subject

KUMAR G. NARAYAN,
Supdt. of Agri. and Forests.

Cooch Behar, January 20, 188[illegible]

NOTE.—We publish the above and invite our correspondent "Rust" to either put himself in communication with the Kumar, or if the latter will mention what "further information" he wants, "Rust" might send us whatever further information he may on the subject for the benefit of the public.—ED. *I.A.*

Editorial Notes.

THE report for December on the prospects of the Oil-seed Crops of the Punjab states that the estimated area under rape seed in 21 selected districts is 511,000 acres, or 8 per cent less than last year. This reduction in the area is ascribed to deficient rain.

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ACCORDING to the latest reports from the Red Sea, there has been an increased flow of oil at the petroleum wells, but the oil is much mixed with water. The new borings at Jebel Zeit are as yet unproductive, and it is only the original springs at Temseh that are yielding larger quantities. After a few more borings there, additional experiments will be made in the neighbourhood of Khalka on the Ismaliah Canal and Helouan, close to Cairo. The Egyptian Government have received a letter from Mr. Cope Whitehouse, dated from the Moileh Oasis, reporting that he has surveyed eight hundred square miles and has completed sixty kilometres of accurate levels ; the result proving that Wady Moileh is entirely below the level of the Nile, and can easily be converted into a reservoir. He has also discovered a new oasis containing ancient remains and traces of a cemetery.

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THE *Englishman* notices it as curious that "in spite of the rivalry of Indian gardens, the Chinese find it profitable to export a by no means inconsiderable quantity of tea to Calcutta During the last official year they sent us 52,123 lbs. The trade is said to owe its existence solely to the very inferior quality of the tea, which is sold at a correspondingly low price; a principal consideration with many who from choice or necessity regard its cheapness as the first essential of a purchase. The trade, however, is steadily declining, and ten years ago the importation amounted to 692,852 lbs." The fact of the matter is that China tea still holds an honoured place in many households, where the fragrant leaf forms an essential part of the daily dietary, and although the quality of the Chinese article has steadily declined, and cannot compare with our splendid Assam and Darjeeling teas, yet inferior tea continues to be used, perhaps as much for its cheapness as for a certain conservatism in taste which refuses to recognise anything outside of "good old China" as fit to drink in the shape of tea. Even in England this is the case, as the annual shipments of

China tea amply testify. They are far in excess of shipments of Indian, Ceylon and Java teas put together.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 19th January 1887 :—Rain has fallen generally throughout the N.-W. Provinces and Oudh, Punjab, the Central Provinces, Central India and Rajpootana. In parts of Bengal and in Assam and Sind slight showers have also occurred. Except in Sind, the *kharif* harvest has come to a close in all parts of the country, and threshing operations are in progress. The recent rainfall has been of considerable benefit to the *rabi*, which is generally in excellent condition throughout the country. In the northern districts of the Central Provinces alone some damage to the crops is apprehended in consequence of the late heavy rain. In Madras a paddy harvest still continues and general prospects are good. In Mysore and Coorg the outlook is favourable. The rice harvest in Bengal is nearly finished with a good outturn, and in Lower Burmah the reaping of the crop is well advanced. Poppy continues to come up well in the N,-W. Provinces and Oudh, but in Bengal the crop has been injured in places by rain. The coffee harvest is in progress in Coorg. The public health is generally good in all provinces. Prices are rising in four, and fluctuating in two districts of the Punjab, and are falling in Coorg. Elsewhere they remain generally steady.

A WORK just published by H. Semler, in San Francisco, entitled *Die Tropische Agrikultur*, contains interesting information on some of the medicinal products of the vegetable kingdom. Our contemporary the *Chemist and Druggist* contains a review of the work, from which we cull the following paragraphs:—Regarding the kola nut. It is said : The botanical name of the tree yielding the kola nut, Mr. Semler states as being undefined, and quoted by various authorities as *Sterculia acuminata, Sterculia cola* and *Cola acuminata*. We should have thought that there was no question as to the first being the correct designation. It is also mentioned that slave dealers were in the habit of carrying with them a supply of kola nuts, for administration to their slaves as an antidote to the suicidal mania with which from time to time they were afflicted, and that it was through these slave dealers that the kola nut was introduced in the West Indies, Mexico, Brazil, and Mauritius. In these countries, however, the white population have never paid the slightest attention to the tree, of whose presence in their midst the vast majority are quite unaware. A regular export trade is even carried on in kola nuts from Lagos and Loanda to Brazil. It is also suggested that a large proportion of the kola nuts imported into England are used in the preparation of low grade chocolates with the addition of a little cocoa.

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IN a note on guarana, the author states that the word is derived from the Guaranis Indians, which tribe are said to have first prepared the paste. Afterwards the tribe of the Mauché Indians usurped the monopoly of the preparation of guarana, but at present the paste is prepared by Indians and whites alike. The use of guarana has greatly increased in Brazil of late years, and it does not speak for the energy of the natives that they have as yet taken no steps to cultivate the guarana tree. The fruits of the tree are gathered in October and November, and opened with a hammer or stone, and the seeds, of which each fruit contains from two to six, of the shape of a horse-shoe, are abstracted. These seeds are dried in the sun or at the fire until the white skin with which they are covered may be rubbed off with the hand. They are then pounded in a mortar, and kneaded into a dough by the addition of a little water or dew. To this dough a certain quantity of coarsely-powdered or whole seeds are added, and the mass is then either formed into balls or, and more frerquently, into the sausages which are known to European druggists as guarana paste. The sausages or balls are baked in the sun or by artificial heat, and sent to the market in banana leaves or mats. An inferior quality of guarana is prepared by mixing cocoa or cassava with the seed, but this quality may be distinguished from pure guarana by its paler colour and comparative softness. Nearly all the guarana collected in Brazil is taken to Santarem, in the province of Para, a town of about 6,000 inhabitants, situated on the right bank of the river Tapajos near its confluence with the Amazon, and which trades chiefly in cocoa and the medicinal products of the country. The average quantity of guarana brought in to this town is estimated at 16,000lbs. per annum. On the Santarem market the price of guarana is generally about 9*d*. per lb., but at the original points of collection, which are mostly situated on the Rio Negro, it is much less. This statement of Mr. Semler's is in singular contrast with that of Messrs. Gehe and Co's last report (*vide The Chemist and Druggist*, of September 25) that it seems to be the fact that it does not pay the Brazilian shippers to export guarana if the European price is less than 6*s*. per lb.

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FIFTEEN pages are devoted to coca culture, on which subject a good deal of interesting information is given. According to Mr. Semler, the Bolivian Government derive an annual revenue of some 40,000*l*. from the lease of wild coca shrubs. It is pointed out how much the value of the leaves could be enhanced by a rational system of cultivation and proper care in the packing of the leaves, for instance by shipping the leaves immediately after gathering in tin-lined cases. But no such rational procedure can be expected from the natives of the South American Republics, and it will probably be left to intelligent planters in the British or Dutch colonies to supply the European market with an article which has preserved as far as possible its original freshness. The author appears anxious to make it known that the idea of the work under notice was not conceived by him in consequence of the development of German colonising enterprise, but that for fully ten years he has been engaged in compiling notes as the basis of a book which should be looked upon as a standard work among the large number of his compatriots engaged in planting and commerce in the tropics. He enumerates several English and Dutch works which have been written on the same lines, but claims for himself and for his nationality the honour of having produced the first complete work. In how far this claim is well-founded can only be judged after the publication of the whole series.

MR. SHIRLEY HIBBERD, the well-known author of many works an horticulture, has addressed to the *Times* a strong protest against the wholesale adulteration of coffee by London retail dealers. He says :—" Coffee deserves the importance it has acquired as a subject of public discussion, and the more so because it is but little understood. At good tables poor coffee is too often seen, and it may be said that on the world's table (in these parts) it is never at all, but in its place appear various nauseous and injurious imitations. Valuing coffee as a great aid in hard work, I made a resolve to have the real thing on my table daily, or "perish in the attempt." Thereupon, I entered upon a series of experiments that were at least amusing if not particularly profitable. I bought every kind of coffee I could see or hear of, and tried every possible (and some impossible) way of making it, having the assistance therein of a diligent and clever cook. One striking result was the discovery that ready-ground coffees sold in canisters, packets, and other " convenient" parcels are bad, some very bad, a few infamously bad. After trying innumerable samples without noting one that was worth trying again, I concluded that canister coffee is an unmitigated cheat, consisting usually of a mere shadow of the real thing, with a great bulk of chicory, and more or less of what is termed 'colour' this being simply burnt sugar to give a fictitious strength. What may be termed 'chandler's coffee' is so bad that I strongly recommend a trial of it to respectable people who love good living, for they ought to know by a taste of real agony how the poor are robbed, and poisoned, and have, as it appears, no protection from law, gospel, or the customs of society."

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IN what form to purchase coffee, how to test its purity, and the best method of preparing it for use, are questions upon which Mr. Shirley Hibberd also makes some very sensible observations. He says :—" It is not good policy to purchase

coffee ready ground, but if it must be done, the supplies should be small and frequent. Anyone may test the purity of ground coffee by shaking a little over a tumbler of clear, bright, cold water, and leaving it for an hour or so. Pure coffee communicates its colour to cold water slowly, and when the colour has been imparted the infusion is still bright and clear, and the colour is never deep. But chicory and other adulterants quickly produce an opaque and dark infusion. The difference is so striking that for ordinary purposes a better test is not required. To place good coffee on the table daily is a simple and inexpensive business, but it cannot be done at a penny a cup, as some folks are in haste to aver. At from 1s. to 1s 8d per pound, a good coffee in berry is always obtainable, and 1s 4d may at the present time be considered a fair family price. It is best to roast and grind as wanted, but the grinding is the one important point, because ground coffee quickly parts with its aroma, and there is a great charm in having it made immediately from the mill. In some houses the trouble of grinding is thought much of, but, as a matter of fact, it is almost nothing, and a mill costing only a few shillings will last a lifetime."

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He goes on to say that "Coffee should never be boiled it should be made with soft boiling water at boiling heat, but if hard water must be used, it should not be made to boil until wanted, for boiling augments its hardness. A common tall coffee pot will make as good coffee as any patented invention, but a cafetière is a convenient thing, as it produces bright coffee in a few minutes, and thus enables us to secure a maximum of the aroma and dispense with the use of any rubbish called "finings." Everyone to his taste, we will say, but as careless people make the coffee too strong one day and too weak the next, the ground coffee and the boiling water should be both measured, and it will always take as much as four cups of water to make three cups of coffee. For the breakfast table the addition of about one-eighth of chicory is an improvement, but for the dinner table coffee should be made without chicory, because it dulls the piquant flavour of the genuine article. Two points in coffee-making deter people from using it—the trouble of grinding and the boiling of the milk. The grinding, however, must be done and it is really nothing, but the boiling of the milk may be advantageously evaded by using Swiss milk, which harmonises perfectly, and by many well-trained palates is preferred to fresh milk heated. Good coffee is such a grand help to men who work hard, that I shall hope to be pardoned if I have said a word too many on the subject."

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The *Produce Markets' Review*, in its issue of December 18, makes the following observations on Indian tea :—The demand for Indian tea continues active, but the quantity on offer has been very large, and last week's prices have not, in several instances, been maintained. The commoner grades have been largely dealt in, but at prices showing, in most cases, a slight advantage to the buyer. A downward tendency is not surprising, considering the very heavy supplies on the market coincident with the near approach of Christmas, when the retailers generally are absorbed in selling Christmas goods, and have little time or inclination to buy anything. Apart, however, from the slackness in demand, which will inevitably be experienced here during the next week or two, it is reported from Calcutta that in the recent sales held there, the proportion of very low priced tea sold amounted to upwards of 50 per cent of the total supplies, so that there certainly appears no immediate prospect of any material advance in the value of common sorts. For all good and medium descriptions there has been an active competition, and former rates are well maintained ; the finer qualities have sold irregularly, but on the whole at slightly easier prices. There has been a good inquiry for the larger quantity of Ceylon tea offered, values generally have been well maintained, and in some cases, for parcels possessing superior quality, extreme prices have been paid. Java teas have been sparingly offered, and have fetched comparatively firm rates. At the public sales there were 30,897 packages brought forward, including 28,133 Indian, 2,159 Ceylon, and 605 Java tea. Excepting for the lower and finest grades of the former, which favoured buyers, values were steady.

The same paper mentions that an able pamphlet has been published (price 1s.) by Effingham Wilson, Royal Exchange, London, on the Silver question, under the title, "The Sacrifice of India." The point of view taken is, says our contemporary that so far the fall in the value of the rupee has immensely helped to develop the industries of India, and among them that of tea. In short, that if the Government, by any possibility, were induced to interfere, and were to succeed in raising the rupee to par, either the price of tea would have to rise here 25 per cent, or the producers would lose money. The statements in the pamphlet fully prove the correctness of the argument, so that the Silver question, which affects India and China as well, is one that closely concerns not only the tea growers in India and China, but the tea trade and consumers in England. Any interference with the natural laws of supply and demand is, indeed, as likely to be injurious with gold and silver, as it has long ago proved to be with other commodities. It is as mischievous and as futile for the Government to enact how much a rupee or a shilling shall buy, as it is for the authorities to fix the price of bread or meat.

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A local "daily" notices the absence of any statistics regarding the loss of life and property by lightning in India ; that no Government seems to have devoted much attention to the subject in its effect upon their own people ; and that the best records available come from Germany. It therefore proceeds to tell us that the German investigations show that in the temperate zone the oak is most frequently, and the beech least frequently, struck by lightning, and the former tree is said to be fifty-four times more dangerous than the latter as a place of shelter in a thunderstorm. The beech, in fact, is stated to be the safest of all trees for that purpose in German latitudes, being 15 times safer than the pine, larch or fir, and about 40 times safer than most other chief varieties of the forest timber of Germany. Old trees and those standing isolated are, again, more dangerous than trees congregated in woods and plantations. With regard to buildings, their security, when not protected by conductors, depends chiefly on the material composing the roof. Slate and tiles are less dangerous than wood or a straw thatch. The nature of the soil has also an influence in determining the risks from lightning. A locality with an upper stratum of limestone is said to be seven times safer than a region with a clayey soil. These results must, perhaps, be regarded as approximations to the truth rather than the truth itself, but they denote a beginning in an enquiry of some interest and importance. The Meteorological Department might, with possible benefit, devote some of its powers of observation and comparison to the investigation of similar phenomena in India.

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The following facts connected with the Swiss Condensed Milk industry from the *Revue Scientifique* will, we think, be read with interest :—"The chief seat of this new important industry is the little village of Cham, situated on the Lorze, a few miles from the lake of Zug. The chief factory there, which is the principal of seven, all belonging to a wealthy company, concentrates daily about 60,000 litres of milk, the produce of more than 8,000 cows, and sends out from 15 to 17 millions of tins of preserved milk annually. The Company collect the milk from the farmers of the neighbourhood, and pay 12 centimes per litre for it. On reaching the factory the milk is poured through a silk filter into a large reservoir. In the reservoir it is automatically weighed and then drawn off into large copper boilers, and is heated to about 35° C. by steam. To the milk one-eighth of its weight of cane-sugar is added, and when this is dissolved, another automatic action carries it into vacuum pans in which it is concentrated by boiling at a temperature of 52° C. Under these conditions the constituent elements of the milk (fat, casein, &c.) are unaffected. The milk is reduced to one-third of its volume after three hours in the vacuum boilers, and at that time it is of the consistence of a thick syrup. It is passed into great cylinders, which are kept constantly plunging into running water, and by this means it is rapidly cooled. It is then conveyed to the upper floors and poured

refully tied up, and the union and the top of the stock covered th grafting wax.

TERMINAL CLEFT GRAFTING.

This is a variation of the preceding, and is very rarely employed cept by the most experienced propagators, and then only with ch subjects as are found extremely difficult to propagate by any ier method. The difference consists in the stock not being aded down as in the preceding, but a vertical slit is made straight ough the terminal bud.

SADDLE GRAFTING.

This may be described as cleft grafting reversed, the apex of the ck being sloped upwards like a wedge, and the base of the scion lit, the lower ends of the slit sides being thinned so as to fit the of the stock accurately. This is a very simple and effective de of propagating plants of a succulent nature.

PROTECTING THE GRAFTS.

One of the most important points in grafting is to insure a perfect lusion of air and water from the points of union, and to effect many devices are resorted to. Thin sheets of India rubber or ta-percha answer well for small subjects, and especially so ere the union is quickly effected. Clay also when procurable of right kind and properly prepared answers admirably, but unless a very tenacious nature and thoroughly kneaded is very liable crack when exposed to the air. The best protection of all is un- ibtedly grafting wax, the best being a patent preparation sold ler the name of "Mastic l'homme Lefort;" where this however iot procurable, the following will be found an effectual substitute. ke one pound of common yellow resin and melt it gradually; en of about the consistency of syrup add 6 oz. of alcohol of 90° ring constantly until thoroughly mixed; keep in well stoppered tles. Or the following, resin 1lb, Burgundy pitch 9 oz.; melt se thoroughly; at the same time melt separately beef suet 3 oz. ir the suet, when thoroughly melted, into the first mixture, ring it well while doing so, then add 6 oz. red ochre, dropping n gradually: stirring the whole till thoroughly mixed. The preparation is preferable to the former. When required to be l in the rainy season, the only disadvantage being that it re- es to be melted to a proper consistency before being applied; reas the former if kept carefully excluded from air is always fit ise.

RUS IN URBE.

Miscellaneous Items.

LVER is said to have been recently discovered in large quanti in the north and south of Caldwell City, Kansas, United s. According to the report it underlies the entire city, about eet from the surface, and extends several miles into the tory.

total receipts from ten sales of Bengal opium and nine hs' pass duty on opium exported from Bombay has amounted to 7,18,54,885, which is Rs. 2,79,885 better than the estimates, receipts from Bengal are Rs. 31,24,540 below the estimate, hose from Bombay are Rs 34,04,425 above the estimates.

UGAR manufacturing and refining factory was opened at Now- on the 23rd ultimo. The company to which the factory be- is on the limited liability system, and the Gaekwar is an exten- shareholder. If this new industry succeeds, it is hoped that Gaekwar will sanction the establishment of a paper mill, and -mill at Gandevi.

quantity of Tea exported from China and Japan to Great n from the commencement of the season to the 21st of Decem- as 134,588,631lbs. as compared with 142,914,001lbs. exported the corresponding period of last year. The exports to the d State and Canada during the same period were 78,450,741 against 68,813,125lbs.

HOUGH the Behar districts maintain an easy pre-eminence in dian indigo market, a considerable and growing trade in taple is done in the Punjab with Mooltan as a centre. Last hirty thousand maunds were exported from that town against n thousand maunds in the previous twelve months. The ts chiefly engaged in the trade in the Punjab are Mooltan, ergar, and Dera Ghazi Khan. The quality of the indigo is o be of the coarsest. Last year the price was quoted at per maund. Behar seems, therefore, to have little to fear his competitor.

UP to the end of November last the value of gold imported into India was Rs. 1,01,51 275, while that of the silver imported was Rs. 4,45,47,800. Deducting the exports of the two metals, the net imports amounted to Rs. 5,47,07,675. The assay value of coins and bullion received at the Mints was Rs. 3,01,29,050, and of that coined and examined Rs. 3,11,92,550.

THE imports of malt liquor into Bengal have greatly recovered from the decrease which occurred in the year 1884-85. Both the quantity and value have risen, the former from gallons 436,303 in 1884-85, to gallons 560,228 in 1885-86 and the latter from Rs. 10,87,848 to Rs. 13,21,676. The increase is spread over the principal descriptions of beer imported, *viz.*, Bass, Pilsener, and McEwan's. In porter, also, there has been an increase.

THE increase in the consumption of German beer has, of late years, been something very remarkable. In 1873 the total quantity exported by Germany was only 6,400 000 gallons, but in 1884 85 the amount had increased to nearly 25,400,000 gallons. This is, no doubt, due to the growing taste for lighter beer than those hitherto brewed in England. Although the price is some what high, the consumption of German beer has increased most rapidly in India.

WRITING on the subject of forest fires, a correspondent of the *Indian Forester* says:—"In his report on the forests of the Central Provinces (November, 1885 to February, 1886) the Inspector-General notes that his observations led him to the belief that an occasional fire in a forest after some years of successful protection had a less harmful effect than annual fires. Most people believe that a fire in a forest that has been closed for a few years renders the state of that forest worse than the first. Would it not be a useful things to invite the opinions of officers on this important point? I think the Inspector General's idea is true for *Pinus longifolia* forest, but then that is such an exceptionally hardy species as regards fire."

AUSTRALIA has of late years made rapid progress in the production of silver, valuable lodes of which are now being worked in many parts of the colony. In 1883 the total quantity of silver produced was only valued at £18,563. In 1885 the value of silver and silver lead ore exported had risen to £108,281. Instead of being exported the silver is now, to a great extent, smelted at the works which have been established at Silverton and Sunny Corner, the latter having turned out in 1885, 634,016 oz. of silver. The Govern- ment of New South Wales seems to be fully aware of the impor- tance of this new mining industry, and has authorized the expendi- ture of £3,000 for the purchase of silver ingots for show at the Jubilee Exhibition this year.

THOSE interested in the preservation of India-rubber tubing should take note of the following communicated by Mr. H. Warth to the *Indian Forester*:—"Three years ago I found myself supplied with more India rubber tubing than I required, and was afraid that the stock would soon deteriorate. To prevent this, I took 16 feet of 1¼ inch tubing and 16 feet of ¾ inch tubing and soldered it up air-tight in a tin box. I have now had occasion to open the box, and found that the India rubber tubes are most perfectly preserved. They had a strong rubber scent, and are as elastic as could be. The colour of this rubber was originally, and is still, slightly reddish, not brown. If the above experiment proves that India rubber is preserved by air-tight soldering, it would be useful to publish the information as I know that much loss is incurred in this country by the deterioration of exposed India rubber goods, medical apparatus of India rubber, &c."

THE Stock and Brands Department of New South Wales recently presented a report to the Parliament of that colony, which shows that at the end of the year the number of horses in the Colony was 344,697, or an increase of 7,525 during the year. The cattle numbered 1,317,315, being a decrease of 107,816 during the year, and 2,001,904 during the last ten years. The sheep numbered 37,820,906, or an increase of 6,160,585. The increase in the horses was due to the favorable season. The de- crease in the cattle was due largely to the conversion of cattle-runs into sheep stations; 4,656 deaths from disease and drought being reported. The increase in the sheep is attributed to the favorable season, and the large number of sheep introduced to replace those lost by the drought, 775,124 being brought across the border principally from Victoria. The wool clip compares favorably with that of the preceding year, and the quantity exported through

standard by which we value all other things: if gold increases in value they fall in price, if gold declines in value they rise. As there are many strong influences at work urging on a still further disuse of silver and a consequent aggravation of the present situation, it appears to me most pressing that all the farming classes should try to understand this question and do their utmost to save our agricultural industry from the ruin which threatens it. I will conclude with a brief statement of the main outlines of the silver question—

1. The value (or purchasing power) of money depends upon its quantity.

2. If its quantity is lessened, the value of what remains is increased, and that increase shows itself by causing a general fall in prices of commodities of all kinds, such as we have been witnessing during the last eight years.

3. By the free and unlimited use of both silver and gold for money there will be more money, than if a limit is put upon the coinage and use of either metal.

4. Every step in the direction of the disuse of silver means less money and therefore lower prices.

5. It also means that all fixed money payments as taxes, interest, rent, bills, etc., payable in gold become heavier burdens requiring more produce to meet them;

The establishment of a bi metallic currency would be the very best thing for India, and then this fallacy about a low exchange benefiting the Indian cultivator would receive its death blow.

WRITING on the subject of vegetable soap, the *Chemist and Druggist* says: "Hindoos of the orthodox type will not touch a soap made of tallow or animal fat, as it is against the principles of their religion to do so. Such men and women in general, therefore, do not use soap at all, and content themselves by cleaning their hands with simple earth, or the soap nuts, *Sapindus emarginatus*, *S. saponaria*, *S. detergens*, and other species. The name of the genus Sapindus is merely altered from Sapo-indicus—Indian soap. The capsule and seed-vessels are very acrid, but are used instead of soap, owing to the presence of the vegetable principle, saponine. This principle is met with in many other seeds and roots—and the legumes of *Acacia concinna* in which a considerable trade is carried on in some parts of India. Saponine exists in plants of various orders, as in the root and bark of *Saponaria officinalis*, in the root of *Gysophilla struthium*, in the root and seed of *Lychnis githago*, in the root and bark of *Acacia rophantha*, and perhaps other species; in the root of *Monninia polystacha* and *Polygala senega*, in the Monesia bark (*Lucrima glycyphlœa*), in the bark of *Quilla saponaria*, in the fruit of *Æsculus hippocastanum*, in the root of *Polypodium vulgare*, and many other ferns. Many of these are employed in North and South America, the West Indies, China, and the Eastern Archipelago as cheap and ready substitutes for soap for cleansing purposes. Vegetable soap made from cocoanut and other solid oils in India, at Bombay and elsewhere, are conquering the objection to the introduction of that article in the native Hindoo household, and soap is replacing the primitive clay and soap-nut in most districts. Considering the immense proportion of Hindoos in India, there is a very wide field for the extension of soap." We fear our contemporary is a little 'out' as to the orthodox Hindoo "not touching a soap made of tallow or animal fat." Although there are many vegetable substitutes for the ordinary soap, these are only used by the poorest and most ignorant, simply because they are very, very cheap, and easily obtainable. Soap made from animal fat has been known and used in India for a very long time under the name of *sábun*, and a really superior kind of soap is manufactured in Jeypore (Rajputana) by the Rajpoot Hindoos themselves, and largely used in Hindoo households. Since European soaps have found their way into this country in such large quantities, and at such low prices, their use has become very general.

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WE regret to announce the death of Baboo Hari Mohan Mookerjee of Seebpore, for many years lecturer on botany at the Normal School, and the pioneer of scientific agriculture among the natives. By his death the country has lost a character of rare simplicity and loyalty to truth. The deceased was an enthusiast in the cause of science. Originally a student of the Calcutta Medical College during the days of the Board of Education, he left college, after four years without taking his diploma. It was about this time that Hari Mohan devoted himself to the study of Indian natural history. He had before been known to some of the great naturalists of the day. As a student of the Medical College, he had for some seasons attended at the Company's Botanical Gardens on Dr. J. M. M'Clelland and Mr. W. Griffith These gentlemen were then prosecuting their researches in Indian geology and Indian natural History and were enriching, with the results of their enquiries, the pages of the *Calcutta Journal of Natural History*, which the two edited. They invited and received him with open arms, and he contributed not a little to build up their fame. For himself, he stipulated for nothing—cared for nothing—content to learn the truths of Nature and advance the cause of learning. With his true Brahmin simplicity, science was its own exceeding great reward. The lion's share of the drudgery and the danger was his. He went to most of the wild parts of India in search of specimens. On one occasion he penetrated with a couple of snakemen to the heart of the Sunderbuns to procure a *sankhochoor* snake, and after capturing one and bagging it, quietly took shelter with a *modee* at night. The *modee* however came to suspect the contents of the bag and drove the Brahman out in the middle of the night into the wilderness as a dangerous customer. He went the length of tasting the deadly serpent poison. It was in this devoted *workmanlike* manner he became a practical botanist, and zoologist

Utterly destitute of ambition and without a grain of obtrusiveness in him, he was content to pass the best part of his life in a subordinate position, as lecturer of practical botany, in the Calcutta Normal School. Once only, while there, fortune seemed to smile on him, for Sir George Campbell, who knew him and appreciated his worth, made him the Superintendent of the Government Model Farm opened at Baraset. Many useful and interesting experiments were successfully made by Baboo Hari Mohan in the acclimatization of various kinds of foreign paddy and plants. Baboo Hari Mohan, after the abolition of the Experimental Farm, returned to his old duties at the Calcutta Normal School.

CATTLE BREEDING IN SOUTHERN INDIA.

ONE of the most satisfactory features in the administration of the Madras Presidency is the Agricultural Department, and the thorough manner in which most agricultural reforms are taken up and carried out. The question of improving the indigenous breeds of cattle is a notable instance of the manner in which the 'Benighted' Presidency carries out its agricultural reforms. We have already on several previous occasions noted with satisfaction the efforts of the Madras Government to arrive at some sort of conclusion as to the best method of bringing about a change in the mode of breeding cattle adopted by the natives. We have now before us a very interesting report by Mr J. F. Price, who was acting Director of Agriculture in October last, on this subject.

So far back as May, 1885, Mr. Price addressed a circular to all Collectors, embodying questions as to (1) the chief fodder stored and used for feeding cattle; (2) the character of the cattle as to size and prevailing colour, (3) the general opinion as to the cause of smallness of cattle, and whether due to the fodder used, and (4) as to any noteworthy breeds of cattle in the several districts, and the points for which they are held in esteem. To these questions replies have now been received, which have established one point pretty clearly, *viz.*, that the inferior cattle to be found so generally throughout the presidency are the result of the employment of bad sires, and of breeding in, and from, immature animals. *This is a defect*, says Mr. Price, to which the Agricultural Department is turning its attention, and which in time, and with long perseverance can, to a considerable extent, be remedied. Another important point brought out by these enquiries is that paddy straw as a fodder results in deterioration in the size of cattle habitually fed upon it. The information given by Collectors on this head is not as precise as we should have wished, but Mr. Price gives it as the result of his personal observation, that where paddy straw is used, the indigenous cattle are small and poor, the cows bad milkers and oxen unfit for anything but to draw the light native plough, and that the prevailing colours are red, brown or black; that when *cholum* is used, the animals are large and powerful, the cows good milkers, and the prevailing colour white, and that were *raggi* is the staple fodder, a compact well-shaped, active and

powerful beast, generally grey in colour and very fair for dairy purposes, is the typical animal. Mr. Price adds that the experience of Mr. C. Benson, the Assistant Director of Agriculture goes to support this view. Further, he has little doubt that it is the kind of fodder used for a long series of years that, to a very great extent, effects the size of cattle, and also has something to do with the prevailing colours.

However this may be, of one thing we feel pretty certain, *viz.* that paddy straw is quite unfit as a fodder for cattle. In Bengal it is the staple fodder given to cattle, and the result is seen in the stunted, wretched, half-starved beasts to be found in the generality of cases all over the province wherever this is so. Any one *looking* at paddy straw would condemn it as a fodder. It has little or no nourishment; its nitrogenous constituents are almost *nil*, while the carbo-hydrates and mineral constituents may be regarded as conspicuous by their absence. Is it any wonder that cattle fed solely on this food should be anything but small, poor and weak? In Upper India, cattle are fed on what is known as *churri*, which is nothing more than chopped *juari* (Sorghum) and Indian corn stalks, and the result is a type of animal greatly superior to anything found in Bengal.

Another important result of Mr. Price's enquiries is, that the Agricultural Department will be enabled to form a very fair idea of the localities from which the best cattle may be obtained for the Stock farm which it is proposed to establish in the Southern presidency. Mr. Price, however, has proposed to the Government to carry his enquiries further by—(1) procuring analyses of the different kinds of fodder mentioned by Collectors; (2) to ask Collectors for information regarding each taluk of their districts of the same description as they have furnished already for their whole charges, and (3) that as it is now known where special breeds of cattle are to be found, the Inspector of Cattle Diseases should be directed, when on tour, to visit the localities where they exist, and draw up a professional description of each breed, and take photographs of typical animals. The last named task Mr. Mills has offered to take up, and it is thought that if these proposals are carried into effect, a good deal of valuable information shall have been collected, and will have accomplished what has not yet been attempted by the Agricultural Departments of other presidencies. The Board of Revenue, while endorsing Mr. Price's proposals, has suggested that, when crediting any locality with a certain breed of cattle, reference be only made to those *bred* there, all importations from elsewhere being rigidly excluded. The system of classification suggested being :—

1. Cattle specially suited for draught,
2. Ditto beef,
3. Ditto mlcking,

preference being given to the first, as the prime requirement of the cultivator is draught power for the plough. The proposals and suggestions have received the approval of the Madras Government, and some interesting information ought to be the result. An enquiry on some such lines might, with much advantage, be made by the Bengal Agricultural Department, as the condition and breed of Bengal cattle is simply deplorable. Mr. Finucane, we believe, is well aware of this fact, and might turn his attention to the subject.

THE WHEAT CROPS 1886-87.

We have been officially informed that the Government of India in the Revenue and Agricultural Department proposes to issue only three memoranda in future, dealing with the wheat crop, from time of sowing to time of reaping. The first memorandum now issued, gives a rough account only, of the state of the sowings. The second will be published about the 15th March, and will afford as accurate information as may then be procurable, as to the area, condition, and outturn of the crop. The third and final memorandum, will be issued in the latter half of May, and will contain revised and fuller information on these points. The first reports for the present season 1886-87, have now been received, and the following particulars regarding the condition and prospects of the winter sowings of wheat are published for general information :—

In the Punjab the area under wheat estimated at 6,857,000 acres or 2 per cent below the area of last year. The October rains, which to a great extent determine the earlier sowings, were confined to the districts near the hills, but during the last week of December, a fair amount of rain fell generally throughout the province, and may pehaps result in widening the area sown. The prospects of the crop at present are on the whole favourable, though more rain is needed in the Ambala, Ferozepore, Sialkot, and Peshawar districts.

In the North-Western Provinces and Oudh the prospects up to the 30th November were very fair, and the sowings were coming up excellently except in places where it had rained immediately after the seeds had been put down. Later reports show that the fields are being irrigated and they confirm the promise of a good crop. The area sown at the end of November was estimated in December to be about 4 per cent in excess of last year's area (5,240,300 acres).

The prospects of the wheat crop in the Central Provinces at the end of December were very promising, especially in the Northern districts, but some damage may have been caused by recent cloudy weather. In four districts an increase in the area under wheat is expected owing to the favourable rainfall before the sowings began. In Chattisgarh also more land has been taken up for the *rabi* owing to the failure of the *kharif*.

In the Bombay Presidency, the season at the end of November was reported to be very favourable for wheat, and at that date the area sown was estimated to be, if anything, larger than the average in all parts of the presidency. In the early part of December there was some heavy rain in the Deccan and parts of the Karnatak, but no actual damage to sowings was reported. Later information shows that at the end of December the young crops were coming up well and that prospects were good.

In Berar the area under wheat in the latter part of December was above the average, which is 807,000 acres. The crops were a foot high and generally in excellent condition, and there is every promise of a good average yield. In Central India, Rajputana, Hyderabad, and Mysore, the prospects and condition of the wheat crop, so far as can be gathered at present, are also favourable.

The general condition of other food-grains and non-edible crops sown at this season appears to be good, and there is no reason at present to apprehend any diminution in the proportion of the wheat harvest available for exportation. The normal wheat area of each Province is supposed to be as follows :—

	Acres.
Punjab ...	7,000,000
North-Western Provinces and Oudh ...	5,037,000
Central Provinces ...	4,000,000
Bombay (including Baroda) ...	1,883,000*
Berar ...	803,000
Bengal (Behar) ...	850,000
Rajpootana ...	2,500,000
Central India ...	2 500,000
Hyderabad ...	750 000
Mysore ...	20,000
Cashmere ...	500,000
Total ...	25,843,000

GARDENING IN CALCUTTA.

VII.

PLANT PROPAGATION.

Root Cuttings.

This is another very simple method of increasing many varieties of plants, such as Dracænas, Dieffenbachias, Arthuriums, &c., and also a few varieties of Roses (none of which however are found in this country). The Dracæna especially can be most successfully propagated in this way. In re-potting large plants of Dracænas it will be found as a rule that they have formed large tap-roots, very much resembling horse radish. These can be removed without injury to the plant, and should be cut into suitable lengths and placed in pots of sand; these in a short time will throw up young shoots which, as soon as they have obtained a height of about three inches or thereabouts, should be carefully removed from the old root, but with the new roots that have been formed around the base of the shoots adhering to it, and potted in good sandy soil. The old root should again be placed in sand and it will continue to throw out a succession of young shoots. In this way one root will often produce twenty to thirty plants, whereas if cuttings had been taken from the plant itself not half a dozen could be made in a year.

Cuttings from Bulbs, Tubers, &c.—This is the plant generally adopted to increase Dahlias, Caladiums, Alocasias, and other bulbous

* Inclusive of Baroda but exclusive of the other Native States under the Political control of the Government of Bombay.

the adjoining colonies is said to be steadily decreasing. The total clip was 165,095,249 pounds.

According to the annual report of the Statistician of the Tasmanian Government for the year ending March 31, 1886, a summary of which we find in a recent copy of the *Tasmanian Mail*, the total land under cultivation in the island is 416,777 acres. According to the tables of gross produce the island produced last year 524,353 bushels of wheat, 167 466 bushels of barley, 784,325 bushels of oats, 1,040 bushels of rye, 159,087 bushels of peas, 9,709 bushels of beans, 1,466 bushels of tares, 17,846 pounds of linseed, 30,913 tons of turnips, 53,521 tons of potatoes, 1,250 tons of carrots, 12,807 tons of mangel wurzel, 183 tons of onions, 37,163 bushels of grass seeds, 51,872 tons of hay, 292,461 bushels of apples, 24,013 bushels of pears, 768,660 pounds of hops, and of other crops, 374 tons, 70,035 bushels and 753,258 pounds. The live-stock returns place the number of horses in the island at 28 610, showing an increase as compared with last year of 1,422; of cattle there are 138 642, an increase of 9,809; of pigs, 67 395, an increase of 10,092. Sheep, however, still continue to diminish in number, being 71,400 under the number shown for the previous year. The decrease in sheep is attributed to rabbits, fluke, and the increasing tendency to fatten stock for the market, but allowance is made for the greater extent of land occupied in the rearing of cattle and pigs. Cows kept for dairy purposes have increased from 25,316 to 28,505, an increase of 3,189, or eleven per cent in one year. This is considered as a very satisfactory showing, and the fact that there is an increasing disposition on the part of landholders to fatten stock for the market is also looked upon with favor, as it will result in supp'ying the markets with home-raised meats.

Selections.

THE INDIAN SILK INDUSTRY.

MULBERRY TREES.

The mulberry tree grows rapidly in almost all the soils of warm climates. It requires a copious supply of water in all seasons except during the two winter months, when its leaves are shed. In summer it requires heavy watering at least once a week. With heat and water the strength and productiveness of the plant are speedily developed. The care of the seed plot is the most delicate point in mulberry culture. It can be successful only under certain conditions which I shall attempt to enumerate briefly. The heat of the sun is the great obstacle when sowings are made in June. If the fruit is gathered it is necessary to separate the seed from the pulp in order to secure regularity in the sowing. If it is desired to sow thinly so as to obtain robust plants, the very first year, the seed may be mixed with sand, and care should be taken that it is sown in ground specially prepared and protected from the burning rays of the sun; under trees, for instance, or else covered with long straw. As the soil must be kept constantly moist, it should be watered every evening with a watering pot. In 12 or 15 days the seed germinates, and must be treated in the same manner as before till the two first leaves have been fully formed when the straw covering should be taken off and the seedlings watered copiously, without using the water pot. In autumn the plants grow rapidly, attaining the thickness of a pen-holder and a height of from 40 to 80 centimetres, according to the surrounding space When the seedplots have succeeded they are weeded and thinned by pinching of all superfluous plants.

Whatever be the ground, it must be dug to the depth of from 40 to 50 centimetres as early as possible. It must then be levelled and divided in to beds of one metre in width. Between two beds there should be a foot path from 30 to 40 centimetres wide to facilitate watering, weeding, &c. The seed should be sown broadcast in pinches, without fear of sowing too much. When autumn comes and the leaves are fully formed, the seed plots should be carefully examined, and when the ground is thoroughly soaked with water all weekly plants, or plants with small or deeply incised leaves, must be pulled up. These plants could but have given miserable leaves compared with others. I cannot repeat too often that the seed plot requires the greatest care, but once the plants are up, if only of the thickness of a thread, the mulberry tree gains strength very easily. To avoid the rays of the sun of June and July, it would be preferable to make the sowings in the spring, in March for instance. It would be sufficient to provide oneself with good seeds of the white mulberry. Sowing in spring has the great advantage that you can from March to June get through a series of sowings, undertaking a second when the first has germinated, and thus with a small staff obtaining a large number of plants. In summing up the different sowings one should obtain 10,000 plants to the "acre" (1196 square yards). The soil of the seed plots, being well prepared, need not be dug up again. The number of plants will not permit it and it will be sufficient to weed and water the ground well.

When the seedlings have shed their leaves and the bare stems remain in mid winter, they can, after a profuse watering, be pulled up by handfuls. The stronger ones only should be selected the weaker should be left to develop further. Previously to this the ground should have been prepared according to the recognised rules of cultivation, and laid out in ridges more or less apart accordingly as you require a quicker or slower development. The small plants, pulled up, as just explained, are then planted in rows on the side of the ridges. Immediately after planting they are cut down level with the ground, and if during the year care has been taken to destroy the lateral shoots, the result will be a growth of from two or three metres in height. You can also make from the plants of the seed plots, hedges, trimmed mulberry trees, &c. When one plants in copses, the plants should be as close as possible, to obtain a prompt supply of leaves. The plants in rows are about 1·50 to two metres apart. The best pruning is that about one metre from the ground. In three years you can rely on obtaining from 25 to 30 seers of leaves from each tree and at least 100 seers in five or six years. I would advise pruning in the shape of a crown on three branches, and year following on two of each of the three branches, which would make six branches, and so on up to a complete formation of the form of a salad bowl The tree at its 10th or 15th year will have a trunk of from 30 to 45 centimetres in diameter, and its value may be estimated at from 15 to 20 francs per tree. If by pruning intelligently and according to the requirements of the country a form is given to the trees which is appreciated their value may be much higher. The *multicaulis* variety of the mulberry yields a sure income.

Its cuttings are easily made and take root at all seasons. It throws out its new leaves 20 days before other varieties, and sheds them 20 days later. You can plant 20 per square metre. If you do not wish to preserve them you can graft on them during the ensuing spring and obtain in the course of the year a growth which would have needed three years if raised from seed. You might also cut off a branch, graft it, and place the graft in the soil as an ordinary cutting. The very first year's plant will be secured of 0 50. to 1.50 centimetres in height. The *multicaulis* variety should be cut level with the ground when cultivated for its leaves. In a every case one learns by practice, for in this country practice should always take precedence of theory. If you follow to the letter what is recommended for Europe, you will not attain the desired results so soon Plantations of white mulberry trees on the border of streams, roads, or fields would be of great benefit to silk culture.

In no case would the plantations injure the crops of wheat rice, &c. On the contrary, they would restore to agriculture rich and large tracts which are now lost owing to the native system of sowing, and even yield the value of their ground rent owing to the inferior quality of the leaves which often prove insufficient to feed silk-worms properly till their spinning stage, a fact which I have frequently witnessed. With such plantations the abundance and the nutritive and silk-producing quality, of the leaf would make it easy to obtain a large crop of European silk-worms anually, and a second one in autumn, which would show a profit five times more renumerative than three or four miserable crops of country cocoons. The regular hatching of the silk-worm eggs can always be easily secured by preserving them for three months in an ice house arranged for this purpose, the cost and keep of which would be trifling. The eggs, after a hibernation of three months, can be hatched as easily as animal eggs.

By the last mail per the *Tibre* I received a sample box of silk-worm eggs of yellow and white cocoons, of which the greater part has been given to persons in the mofussil who are interested in the trade Should however, anyone wish to make experiments in cellu'ar reproduction for the next new crop with these eggs, I can still give some samples for trial —G. Gauthier, in *Englishman*.

THE FOREST DEPARTMENT, BOMBAY.

The Administration Reports of the Forest Department in the Bombay presidency (including Sind) for the year 1885 86, have been promptly issued, as they embody correspondence dated so recently as the 10 h ultimo. This is an improved arrangement, which is very commendable, for the practice has been hitherto to supply the press and the public with official publications fully a twelve-month after date. In noticing the interesting Report before us, it is necessary to allude to the appointment of a Commission in 1885 to inquire into Forest matters. Complaints had been made during the early part of that year about the stringency of the Forest rules, about the "deprivation" of rights in respect of forests and forest produce which the people had been enjoying for years and against the Forest Administration generally In a Resolution dated the 24th July, 1885, the Governor in Council, wishing to secure an efficient management of forests, and believing that their conservancy and the maintenance of the rights of the Crown would be beneficial to the interests of the people, in providing for a continuous supply of timber, and other reasons stated, instituted a Commission, of which the Collector of Thana was appointed chairman. The appointment of such a Commission was very advisable to hear complaints and ascertain their reality; and to consider the best manner in which provision could be made for supplying the wants of resident agriculturists as distinct from trade demands. The situation of wild tribes was also to be taken into consideration, sufficient employment being found for them to enlist their sympathies; and means were to be suggested whereby the regulations of Government could best be made intelligible to the people, and their co-operation secured. The labours of the Commission were considerably facilitated by a series of questions being framed with the object of eliciting the grievances, if any, of the villagers,

and securing the interests and co operation of the wild tribes. As regards the latter, the Commission were enjoined to inquire whether sufficient encouragement, in the way of employment and payment, was extended to induce them to identify their interests with those of the Forest Department. The Commission was opened by his Excellency the Governor in person on the 27th August, 1885, Lord Reay delivering a very eloquent and practical address on the occasion, in which he stated that a speedy, full, and local investigation of the forest conservancy of the districts noted would be welcome to the Government. The Administration Reports under notice include the Northern and Southern Circles, as well as the Sind Forest Circle. It is satisfactory to learn that in the Northern Circle, despite the different markets for timber and other forest produce in several divisions, the receipts derived from the forests were "the largest on record"; while in the Southern Circle it is stated that "last year credit was taken for the largest revenue ever recorded, but during the year under report it has still further increased," the gross revenue being Rs. 17,92,114, compared with Rs. 12,89,562 in the previous year. Much of this increase in revenue, we have no doubt, was due to the re-organization of the subordinate offices, and the attention given to protective establishments. The published reports embodied in each circle are from the Settlement and Demarcation officers of the respective divisions, the reports being accompanied by the usual tabular statements. We note in the Poona Forest division report, that the Bombay Government have sanctioned the adoption of a suggestion made by Mr. Stewart that efforts should be made to induce the holders of land included within the demarcation limits to place their lands under forest protection, on the conditions of a partial or total remission of assessment and of full rights over certain produce. Forest demarcation in connection with foreign States is also favourably reported upon. In the Bhor State the question of forest conservancy has been of some interest, the Chief consenting to a demarcation to be undertaken under the control of the British Forest Department, and to the ultimate introduction of the British forest system into his territories. The Forest Settlement Officer has very responsible duties to perform. He submits his demarcation proposals, stating the area to be constituted and maintained as reserved and protected forest. He works in consultation with the Revenue and Forest officers of the district; and acts with a careful regard to their criticisms and suggestions. The latter confine their attention to ploughing, dairy produce, and breeding for sale. Under the head of Forest Boundaries is included a notice of offences committed where forest offenders are not acquainted with the exact location of boundary marks. This is a matter which has been entrusted to the Revenue Settlement Department. Privileges have been conceded to villagers in the Government forests, in which certain trees may be lopped for rab, subject to the condition that "the leading shoot of a tree is not to be touched; that no branch thicker than the wrist is to be cut; and that young seedlings, or saplings, or shoots from old roots less than nine feet in height are not to be touched." The expenditure incurred upon the creation and constitution of forests in the Northern Circle, during the year under review, amounted to Rs. 1,48,135 10-11. From the report it would appear that the protective establishments maintained are not sufficient for their purpose. We are told that "protection is the keystone of forestry," and hence it is not surprising to learn that the reduction of 220 forest guards has had a very serious effect upon forest protection. In the Thana division, "with the city of Bombay, containing a population of 7,73,196 and a very hungry timber-market so close and accessible," and three lines of railway, it is thought necessary that the forest should be watched to their fullest extent. Forest destruction cannot of course be effectually checked unless there is watchful supervision. It must be remembered that, in addition to wilful destruction, the preservation of forest against fire depends upon the vigilant exertions of forest protective subordinates and the co-operation of villagers. During the year under notice an important order was issued by Government for the regulation of free-grazing and grazing on payment of fees in forest areas. The Reports deal with natural and artificial reproduction in both circles. The conditions of Nature are described as being bountiful, that it is quite unnecessary, in some tracts, to form artificial plantations at a vast expenditure. It is well remarked that "the aim of forestry is rather to induce Nature to produce trees, than to usurp her office in undertaking the work for her." In the Report of the Southern Circle, besides the figures given in connection with the working of the different divisions, there is scarcely any matter of special importance which calls for remark. Attention is drawn to an attempt at agitation against the Forest Department at Sirsi, in Canara, where a few "designing persons" formed themselves into a committee to redress forest grievances. This movement, however, it is said, was subsequently exposed and discredited, no respectable people taking any part in it. On the whole the financial position of the different circles included in the Report may be accepted as very satisfactory, the working of the Department being under careful supervision.—*Advocate of India.*

OF SWEET HERBS.

SWEET herbs, on which our ancestors set so much store, are now-a-days undeservedly neglected. Such herbs as we grow—they have sunk into "pot herbs"—are relegated to the obscurest corner of the garden. A struggling border of parsley, a few slips of thyme, some roots of mint, with a plant or two of sage and of tarragon, represent the sum of modern herb cultivation. The sweetest and most beneficent gifts of nature linger rather as "otiose forms" than things of use. How many are they, blessed in the possession of gardens, who know and value chervil, rosemary, and burnet—not to speak of dill, clary, and sweet marjoram? There are gardeners learned in orchids who could not recognise sweet basil. As for our cooks, they mostly find their herbs dried in the bottle. The greater part have never heard of chives. Rosemary has dropped out of remembrance; angelica survives but in candy, yet for their beauty and interest, if not wholly for their utility, this race of plants deserves a higher place in well-ordered gardens. There is a music in their very names which should stir the imagination. Their sweet and gracious nomenclature breathes of the tenderness and esteem with which they were once regarded. Rosemary and herb of grace, marigold and sweet cicely—the names lighten up our dull botany and awaken a thousand pleasant memories. That they were among the pets of the garden in Elizabeth's age is sufficiently proved by the frequent allusions to them, not wholly associated with the pot and the still, which we find in the early writers. Rue is Ophelia's "herb of grace"—a plant of high moral worth, and by the ancient herbalists endowed with a multitude of virtues. It resists poison and quenches St. Anthony's fire, according to Gerarde. It takes away "crudity and rawness of humours," and is a remedy against dim eyes, being exhibited to that end by the Archangel Michael upon Adam in "Paradise Lost." Weasels are said to chew it when preparing for war upon rats and serpents. But that rue should prosper it should be stolen from a neighbour's garden. Sage has a character scarcely less distinguished in the old herbals. *Cur moriatur homo cui salvia crescit in horto?*—says the *Schola Salernitana*. Gerarde declares it is "singular good for the head and brain." A near relation is clary, once largely used in soups and sauces. Basil is of an ancient and illustrious race, as its name implies—one of the holiest plants in the Indian mythology, and among pot-herbs most esteemed by the Greeks and Romans. Keats has given it a deathless place in poetry. An antidote to melancholy, it is likewise most excellent in soup. There are two species used as sweet herbs, both tender in English gardens. Burnet, which is one of the four essential herbs constituting the *bouquet* of a well-ordered salad, is a plant that has almost dropped out of cultivation in this country, though it is both pretty and useful. It was a favourite with Bacon, to whose fine nose, which could detect in strawberry-leaves dying a "most cordial smell," it had a perfume most delightful when trodden upon and crushed. A hardy plant, it will grow on any rubbish so long as it has the sun. In salads it contributes to "make the heart merry and glad," and the leaves steeped in wine are "good against the shaking and trembling thereof," says Gerarde. Another salad herb, still more beautiful and pleasant is chervil, whose other name is sweet cicely; divorced from which, indeed, lettuce loses its principal grace. The roots of one variety may be used boiled as a vegetable, and are most excellent. The pot-marigold, as it is injuriously called—*calendula*, being the true and only marigold—is a very famous plant. It is the sunflower of the ancients, the original heliotrope (*solsequium, tournesol, girasole*). The vulgar theory which make the tall, gaunt, æsthetic monster, *helianthus annuus*, the flower into which Clytie was turned, is sufficiently refuted by the fact that helianthus is a native of America. Perdita's marigold,

—That goes to bed with the sun
And with him rises weeping,

is a plant of great antiquity and distinction. Tansy is another of the good old-fashioned herbs, once largely used in omelets and as a stomachic, which has now dropped out of use. Dill, one of the great family of the umbellifers, so friendly to man, is hardly to be distinguished from its near relation fennel: both herbs of much virtue. The seeds only of dill are used in this country; but in the East the leaves figure largely in the native stews and curries. The Biblical anise is supposed to be the dill of English gardens. Fennel is one of the most beautiful of a handsome race, worthy of a higher association than boiled mackerel. Sweet marjoram, "a noble and odoriferous plant," beloved of Bacon, has almost disappeared from our gardens. It is supposed to be the *amaracus*, bosung of Virgil and Catullus—a herb for the still-room rather than the kitchen. Rosemary is a still more famous plant, in high favour with our ancestors, and the centre of a thousand legends. Sir Thomas More let it run all over his garden walls—the place which befits it best—"not only because the bees love it, but because 'tis the herb sacred to remembrance and therefore to friendship." This character rosemary derived from the ever-greenness of its leaves, which, according to Perdita, "keep seeming and savour all the winter long." The old herbalist have much effusion over rosemary. Parkinson avers it to be almost as good as bays "for civil and physical purposes," Gerade says it "comforts the head and makes it more merry." The herb angelica, stateliest of the *umbelliferæ*, owes its name to its heavenly character. Among its other divine properties, it is believed to be efficacious in prolonging life. An antidote to malaria, it is also safeguard against witchcraft and enchantments. The plant is a native of this country, and a chief ornament of damp and solitary places, delighting in withy-holts and the banks of rivers. Balm (*melisa officinalis*) is another native now fallen out of favour, though once of high repute, for its healing properties. The bees have a singular fondness for the blossoms. Hyssop (not the hyssop of the Bible) is one of the lipworts (or *labiatæ*), a family noted for its aromatic qualities. The plant is beautiful—deserving and easy of cultivation. Savory is better known in the dried than in the green state. Both the summer and winter kinds have been held in esteem as pot herbs, at least since Virgil's time. Purslane is one of the less-known ingredients of a green salad. And how many now hear of the once renowned elecampane—good, says Gerarde, quaintly, "for divers passions of the hucklebones," as well as for them that are "grieved with inward burstings." Helen, when carried away by Paris, had her hands full of elecampane, according to the legend; whence the classic name helenium. Chives, the most delicate of all the divine onion family, are scarcely known in this country, though to a salad indispensable. It is the leaves which are cropped for use, the bulbs being left in the ground. Though a British herb, it is almost banished from British

kitchens. Tarragon is a little better known, for its flavour cannot well be spared or supplemented. Thyme and mint are perhaps, in use overmuch. Thyme in a garden is always delightful, and might often supply the place of the unmeaning box for edgings. Lastly there is the necessary parsley, "meed of conquerors," the universal, the inevitable herb, rarely out of place, without which our kitchens would be poor indeed. Even parsley hardly receives the justice which is its due in our gardens, being often put away into corners or grown in a hap-hazard fashion.

The conventional distinction which, in the teeth of nature and good taste, is kept up between plants of use and plants of ornament, is the cause of the neglect under which the sweet herbs suffer. They are neither vegetables nor flowers. They keep their stations on sufferance. It is thought much of when a special herb-garden is set apart, somewhere handy to the cook and out of the way of the gardener. Such an arrangement is as absurd as it is unjust. Some herbs need a rich and moist soil, like mint and parsley; others flourish best on poor and dry ground, like fennel and rosemary. Some are tender and need protection, like basil and marjoram; for others the site cannot be too rough and cold. Let the sweet herbs be distributed among the flowering plants and the esculents, according to their natural characters and habits, and all invidious distinctions be banished. What can be more ridiculous than grades of rank in a garden? Why should not marjoram mate with mignonette? why should cauliflower be disdained of carnation? Excluding the larger fruit trees, which are better apart for their own and others' sake, let the garden be after Bacon's plan, where rosemary comes between gooseberry and sweetbriar. In his famous essay on gardens, that wise man has shown a proper feeling for sweet herbs. For burnet, wild thyme, and water-mints, like a true epicure as he was of sweet smells, Bacon would have "whole alleys of them, to have the pleasure when you walk or tread." The best kind of garden is the mixed garden; and this, to yield the greatest delight, cannot dispense with sweet herbs.—*St. James's Gazette.*

ECONOMICAL UTILIZATION OF COW-DUNG AND *RAB* IN THE BOMBAY PRESIDENCY.

READERS of the *Forester* are aware that a commission was appointed several months ago to enquire into the alleged forest rights of inhabitants of certain villages in the Thana and neighbouring districts.

Of the matters to be investigated, not the least important one concerns the right to *rab*, and the means of providing either a substitute for it or a sufficient supply without causing serious injury to the forests which are necessary to protect the hill-slopes.

Rab may be defined as any forest produce of a vegetable nature used for manuring fields It is used in the Konkan chiefly for manuring nurseries for rice seedlings. For this purpose, loppings of trees, with or without cow-dung, are burnt: seed is sown in the ashes: and the seedlings which come up are ultimately planted out in the fields.

The present agitation in regard to this matter appears to be mainly owing to the fact that the forest originally given out for *rab* material is no longer sufficient to produce a continuous and sufficient supply. This failure may be partly owing to the extention of cultivation, but it is also in a great measure owing to the exhaustion of the *rab* forests, and the question naturally arises as to the possibility of employing substitutes for forest *rab*, or of employing the materials used for manure more economically.

It seems to me that the method of preparing and burning the manure, which obtains in the Konkan, must lead to a vast amount of waste, and to a diminution of important chemical and physical activities in the soil. It also appears probable that these obstacles to a rational system of agriculture might be overcome by adopting more economical methods in preparing and applying the manure. Even when manure is not burnt, it is seldom if ever, properly prepared or applied, and there can be little doubt that the manurial properties even of unburnt *rab* and cow dung might be considerably enhanced by a more judicious use of the materials available.

Let us consider what the effect of burning is. In the first place, all the moisture and organic matter of the manure are dissipated in the process. In this organic matter, it is chiefly the nitrogen that is important as nutriment, because it cannot be replaced except by means of artificial manures, or by precipitation from the atmosphere. The dissipation of nitrogen is, therefore, no doubt a serious loss to the crop. Large quantities of carbonic acid are also lost, but, as this gas is decomposed by the leaves, and is always contained in sufficient quantities in the air, its loss is certainly of much less importance to crops than that of nitrogen, viewing it purely in the light of plant-food. This admission does not, however, by any means imply that an additional source of carbonic acid is to be disposed even as a means of nutriment; on the country, it is reasonable to suppose that an abundance of carbon would directly stimulate vegetation.

At the same time, the most useful function of this acid is undoubtedly its action as a solvent of other nutritive substances in the soil, and so highly does Wolff value it in this respect, that he considers no natural land could afford agricultural crops, a sufficiency of phosphates and carbonates without the presence of free carbonic acid in the soil.

In the second place burning has the effect of diminishing the absorbtive power of soils for nutritive substances notably ammonia, phosphoric acid and potash, because soils containing a proper supply of organic matter are able to retain a much larger quantity of these substances than soils which are devoid of organic matter. There is, therefore, in the former case, less fear of nutriment being washed out or of its escaping in a volatile form.

A third objection to burning is that the physical properties of the soil are not improved, whereas, if manure be applied unburnt, the soil is improved physically by the organic matter, which in decomposing turns to a soft friable mould peculiarly suitable to the growth of plants, and which is considered of such importance, that the fertility of soils have often been gauged by the quantity of humus they contained.

I think I have said sufficient to convince the most obstinate cultivator, if he is open to conviction, that the burning of manure entails loss of nutriment, and that it diminishes in soils highly useful physical and chemical properties which certainly cannot be measured numerically, but which every practical farmer and forester know how to appreciate. All this is doubtless already known to the readers of this journal, and I should not have dwelt at such length on the importance of not burning manure, had not a high authority on agriculture expressed his opinion that the methods employed by *rab* cultivators in utilizing the materials at their command are the most economical and remunerative.

In all countries, agriculturists have been extremely tardy in deriving benefit from an increased knowledge of the nature of things, and Indian farmers are apparently no exception to this rule. But they are not all as unthinking as the average Thana ryot appears to be, or at all events he who lives in the forest tracts. A goodly number, perhaps a majority, do not burn their manure, and as a bright example of this genus, I may cite a friend of mine who is a large landholder in the ghat-tracts of this district. He tells me that formerly he used to burn his manure for rice-land, but that he has discontinued the practice because he finds that better returns are realized from *kucha* manure. Although the practice of using unburnt manure is common enough in this district, I must confess that I was agreeably surprised to learn that my friend had actually overcome this prejudice of custom, and changed to a system which indicates a decided advance and leads one to hope that others many follow his example if they see the way clearly to benefiting themselves. It also strengthens my belief that the burning system is merely a bad habit. Fifty years ago, the forest in the neighbourhood of Bombay were considered of little or no value except for the teak and one or two other timber trees they contained, and people were free to take as much inferior wood for *rab* burning as they liked. They have therefore become thoroughly habituated to their wasteful ways, and although the forests are becoming exhausted they are naturally unwilling to abandon what they consider to be a method essential to the making of their crops. In this prejudice, if it be merely a prejudice—and there is not a particle of evidence to show that it is anything else—they have a powerful supporter in the Director of Agriculture, who not only considers forest *rab* necessary for their welfare—which may, or may not, be the case—but also that burning it is the best way of utilizing it as manure. For my own part, I can see no reason why—if *kucha* manure succeeds in a tract quite similar as regards climate and situation to another tract in which a different system prevails—the *kucha* system should not be equally well in both tracts. Nor does there appear to be any reason why grass should not be as efficacious as spray wherever a sufficient quantity of cow dung is available.

Owing to the pernicious custom of allowing cattle to graze all day long in the forests, and to the apathy of cultivators in preparing, preserving and applying manure, there is a dearth of farm-yard manure in most *rab* villages, but I believe that, if the simplest precautions were taken, a much greater quantity might be made available for the fields. For lands to which *kucha* manure is applied in this district, the manure is collected in pits and carried to the fields once a year. Great loss must be caused by allowing manure to lie so long unused, because nothing is done to prevent the escape of volatile or liquid ingredients by spreading layers of earth, lime, &c, from time to time over the manure, and by making pits impervious to liquid: nor is anything done to keep the manure moist and prevent too rapid decomposition. If these precautions were taken, and the manure put out on the land as soon as possible, the result would be a considerable improvement in the quantity and quality of the manure available for his crops. Experiments with pit manure, carried out at Pommeritz during the winter months, show, for instance, that in 12 weeks over 25 per cent of dry matter were lost. It is not likely that cultivators will go to the trouble and expense of constructing suitable, impervious manure pits, nor that they will collect cattle urine to sprinkle over the manure, nor that they will ever simply water it; but it would give them no more trouble to put the manure on to their fields early in the season instead of late, although it would certainly be a less convenient season for the purpose, owing to the harvest operations being then in full owing. Rice fields are generally ploughed up immediately after the crop is taken off the ground in November—December, and all available manure at that season might be applied then, and ploughed under at the same time, instead of being allowed to run to waste in pits until the end of May. There is, I believe, a prejudice against ploughing in, but, of course, the more intimately the manure is mixed with the soil, the less probability is there of losing useful ingredients, and the more lasting it is in its effect as com-

pared with manure simply spread over the surface although the immediate effects may be inferior. Where straw is not available for mixing with the cow-dung, grass (which is procurable in large quantities in all hill tracts) would probably be more useful than any other kind of forest *rab*, as it absorbs moisture much more readily than spray, and it is quite possible that, if the prejudice in favour of leaf *rab* could be overcome, grass would prove a satisfactory substitute, for the chief use of *rab* when mixed with cow-dung which is not to be burnt is to sop up the liquid part of the manure.

There can be no doubt that the system of sending cattle to graze all day long in the jungles is a serious obstacle to agricultural reform. It is much better to have a few home-fed animals than a large and badly fed stock that spends all its days in the jungle. The custom is, however, an old established one, and, as such, is not likely to be abolished in a hurry. But if no reform can be effected in this respect some improvement might certainly be brought about in the stalls, or pens, in which cattle are kept when they return from the jungles for the night. Sometimes litter is put down but, in most cases, the cattle stand on the bare ground and the liquid manure is all lost. If litter, consisting of grass straw or spray, were put down much of this—the most valuable—constituent of good manure would be saved. Properly constructed stalls made so as to completely prevent loss of liquid matter by percolation are of course greatly to be desired, but are scarcely to be expected from the ordinary cultivator.

I am informed that it is customary in Thana to lop the same trees every year. If this is really the case, it may be safely predicted from what is known of the effects of *rab* in Europe, that no forest can stand the drain, and that even if the area set apart for providing *rab* were four times as great as that required, in the present state of the forests, to produce one year's supply, it would be very doubtful if the devastation of *rabed* areas could be asserted. Any measures, therefore, that appear likely to diminish the drain on the forests deserve the serious attention of all who are interested in the welfare of the race of *rab* cultivators: the sooner the ryot learns to economize his materials, the longer will the *rab* supply last, and the better will be his position to meet the day when the inevitable collapse must open his eyes to the real nature of things.—L. M. G., in *Indian Forester*.

TOBACCO CULTURE AT HOME.

This year's partial success of experimental tobacco culture at home has raised the question whether the Irish peasant shall be allowed to add to his income—often little better than a negative quantity—such profit as can be derived from cultivating tobacco, valued at a few pence per pound without duty. Mr. Gladstone himself, out of the fulness of his sympathy for Irish woes, has lent a not unfavourable ear to the suggestion, as he is no longer the Chancellor of the Exchequer. The Irish members, too, will no doubt be willing to assist the establishment of a new Irish industry in every way except by smoking Irish grown cigars. That would be a length to which even patriotism could hardly go.

The climate of Ireland, prolific in pigs, potatoes, and pipe-smokers, is especially suited to the growth of the "noisome weed," also known as "divine tobacco." The miscroscopic seeds—350,000 to the capsule—of this much-abused and yet over-praised plant, germinate best in ground naturally moist and strewn with wood ashes. For this purpose Irish peat would be admirable. The plants further are "greedy feeders," striking strongly downwards into just such fibrous soil as their first cousin, the potato, loves: and no one can deny that the latter grows comfortably enough in Ireland. In those parts of the Continent where the tobacco plants produce leaf of first-rate quality the climate is very similar to that which prevails across St. George's Channel; and in the moist yet temperate regions of Japan it grows vigorously wild in every hole and corner. Yet that it was introduced there by Europeans and is by no means indigenous to the country is obvious from its Japanese name "tobacco," just as they call bread borrowed from the French *du pain* and address all dogs, in imitation as they imagine, of Englishmen, as "Comeer." The fact, then, that introduced tobacco can be grown with profit, and even reproduce itself spontaneously in climates closely resembling that of Ireland, ought to weigh more than any previous failure. The science of agriculture is by no means the mere rule of thumb practice that it was in 1800, when tobacco-culture in the United Kingdom was tried and failed. Many stunted failures of that time have taken root and blossomed into great successes since.

Parts of England are undoubtedly as suitable, too, as any in Ireland or Belgium for tobacco culture. Indeed, James the First, the Sir W. Lawson of British monarchs, felt it necessary to supplement his "Counterblast to Tobacco" by encouraging the growth of mulberry trees and silkworms, with a view to oust tobacco-growing from the high opinion in which English farmers threatened to hold it. Nor is it only for the manufactured tobacco market that the growth of *nicotiana tabacum* would be found lucrative to the British farmer. In America orchard growers on a large scale have found that, by setting aside a small portion of coarse rich ground for tobacco, they are enabled to keep *all* their other crops free from insect pests of every description. Nothing so completely checkmates the earwig—the "straddle bug" of our plain spoken cousins—as the odour of tobacco in solution. With a fraction of an acre of strongly manured soil,—or even those patches of waste ground outside pig styes or cattle sheds, where nettles generally thrive in objectionable luxuriance—'aid out in tobacco, the British farmer or fruit-grower would be able to put not only a heavier, but a much finer crop of everything else into the market. Few people have any idea of the demoralising effect which insect attacks have upon the growth of almost all our cultivated vegetables. Whatever part of the plant they attack, the sum-total of vital energy is affected and the fruit suffers; but once allow the practice of syringing crops with a solution of tobacco to be established and injurious insects would be practically annihilated. Strange to say the tobacco plant itself is peculiarly susceptible to the ravages of caterpillars, which, unless carefully watched will reduce every leaf to a fine lacework of skeletonised ribs; but the dried leaf in solution is one of the few things which no insect nor worm can withstand. If therefore tobacco-growing could once be permitted at Home, irrespective of its success as a staple of manufacture, much good might accrue from its incidental use for purposes of insecticides.

There are of course, several great difficulties in the way of any such permission. In the first place the revenue from tobacco is so enormous that the country could ill-spare it. If the excise duty were taken off British-grown tobacco only, this would be an obvious return to protection of home industries and as such, intolerable to three fourths of our legislators. If, on the other hand, the excise duty were enforced, the growth of a plant requiring more manual labour and supervision than all our other crops put together, and valued, after all, at only a few pence per pound of dried leaves could hardly be profitable in a country like Ireland, where labour, if not scarce, is high-priced and uncertain. To go back on our Free Trade policy by favouring the British farmer is, we are told, impossible. To admit tobacco free of duty would be ruinous to the revenue, and to tax home grown tobacco would leave a very narrow margin of profit indeed.

Another danger would be found in the impulse that would undoubtedly be given to adulteration. If the dried tobacco leaf were only valued at some few pence a pound to the grower, but with the excise added at about three shillings, and when manufactured and ready for smoking at double that again, would not the growth of turnip-leaves, cabbage leaves, potato leaves, lime leaves or any other form of leaf that was sufficiently large and coarse, receive a mysterious and sudden encouragement? It has been argued, too, that nicotine is a powerful poison and, in these days when would-be murderers, owing to the difficulty of procuring poison, go to the length of soaking fly-papers by the dozen in water, it would hardly be wise to permit the growth of a powerful poison by the acre along our highways. Even the wretched Ainos, the half-human subject race of Japan, have learned to mix their arrow poisons of "tobacco ashes and the brains of crows." Notwithstanding all these objections and difficulties however, there remains the solid fact that in the matter of tobacco-growing we have actually turned the principle of Free Trade inside out, against the foreigner. Instead of protecting home industries against the British farmer, laws of England actually forbid farmers at home from growing a crop for which they pay the foreigner. It no doubt makes the revenue easier to collect, but the British working man can hardly be better off because he pays 8*d*. or so in the pound of the price of his tobacco to the planters of Cuba or Virginia. Our treatment of tobacco is, in fact, quite on a *par* with Chinese methods of procedure in the matter of opium—enriching India at their own expense. Nor have we anything like the excuse of the Chinese Government in a public opinion avowedly hostile to the drug. No one now would echo Prior's exclamation—

> "As for tobacco!—who could bear it:
> Filthy concomitant of claret?"

Or with Swift, suggest insurance of all the tobacco in the kingdom against fire. If public opinion in England has learnt to be tolerant of tobacco, why should the policy of the royal author of the "Counterblast to Tobacco" still continue to be the rule of Government? Without saying that the growth of tobacco would make the fortunes of Irish or English agriculturists, it seems only fair that if they claim the right of competing with foreigners to supply the English market they should be allowed to do so, unless the difficulties in the matter of excise can be proved insuperable.—*Pioneer*.

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 26TH JANUARY]

Madras.—General prospects good.

Bombay.—Slight rain in the Shikarpore and Upper Sind frontier districts. In several districts standing crops slightly damaged by blight and frost. Fever in parts of eleven, cattle-disease in parts of ten, and smallpox in parts of four districts.

Bengal.—The weather was cold, and general rain fell during the week. Rain was heavy in Behar, in parts of North Bengal and Chota Nagpore, and in Chittagong and Moorshedabad. *Rabi* crops are generally in good condition. Rain has been unfavourable to poppy in Shahabad, and caterpillars are causing damage to this crop in Gya, Muzufferpore and Hazaribagh. Public health is generally fair.

N.-W. P. and Oudh.—General rain throughout the week accompanied by hail in some places. Slight injury to crops reported, but the *rabi* has generally benefited by the rain, and prospects continue favourable everywhere. Poppy thriving. Supplies abundant, and prices fairly steady. Public health good. Cattle-disease decreasing.

Punjab.—Rain has fallen in the Hissar, Delhi, Umballa Kernpore, Amritsar, Lahore Dehra, Ismail Khan and Peshawur districts ; more wanted in the Hissar, Ferozepore, Lahore, Shahpore and Peshawar districts. General health good. Prices rising in the Umballa, Multan, and Rawalpindi districts, fluctuating in the Hissar, and Delhi districts, elsewhere stationary. Prospects of the *rabi* harvest good, except in Shahpore and Peshawar where crops are suffering from want of rain.

Central Provinces.—Some of the *rabi* crops have been slightly damaged in the northern districts by rain and hail. Prospects otherwise good. Prices steady.

British Burmah.—Slight cholera in Akyab, Rangoon, Tharrawaddy, and Thayetmyo. Otherwise public health satisfactory. Cattle healthy. Slight disease in one district. Harvest generally well advanced. No rainfall beyond a few drops in Prome.

Assam.—Weather cloudy and rainy. Ploughing for *ahu* commenced. Reaping of *sali* finished. Gathering of mustard in progress. Reaping of *kalai* continues. State and prospects of the crops favourable. Public health fair. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Harvest of coffee and rice continue. Prospects of season generally favourable. Public health good. Prices slightly fallen in Kadur and Chitaldroog Districts.

Berar and Hyderabad.—Weather clear and cool. *Kharif* crops ready for market. *Rabi* in good condition. Weeding of *rabi* crops continues. Wheat and gram crops becoming blighted. Fever prevalent in slight form, also cattle-disease. Prices stationary.

Central India States.—Weather cold and seasonable.—Prospect of *rabi* and other crops favourable. Health good. Prices rising.

Rajpootana.—Slight showers in many places. Weather cold and seasonable. Tanks and wells low and drying in four States ; full in others. Crops generally in a flourishing condition, and prospects good. Small-pox very prevalent in Kerowli, otherwise public health good. Prices show a tendency to rise in most places.

Nepal.—Cold wintry weather. Snow fell at Katmandu on the low hills in the neighbourhood on the night of the 20th. This is a very unusual occurrence. Prospects fair. Prices still high.

Letters to the Editor.

RHEA.

TO THE EDITOR.

SIR,—I am anxious to know something about rhea, and should be immensely obliged if you could kindly give me some information, regarding the cultivation of the rhea plant and the manufacture of the fibre ; or recommend me any report or book on the subject.

KUMAR NARAYAN,
Supdt Agri and Forest.

Cooch Behar, January 25, 1887.

NOTE.—The subject has been discussed at great length in the columns of the *Indian Agriculturist* from time to time. We would, however, refer our correspondent to a paper on Rhea by W. H. Cogswell in the *Journal* of the Agri-Horticultural Society of India, Vol. VII Part II 1884, a note on fibre machines by the Deputy Secretary of the Society, in the same; a paper on Fibre Machine trials by Messrs. Hanlon and Leotard, in Vol. VII Part III of the Journal for 1885 ; another paper on Rhea by Mr. S. Jennings in Vol. VII, Part IV. of the *Journal* for 1885, and finally a note on raising Rhea from seed, by J. W. Minchin of Glenrock in the same number of the *Journal*. Those are, we think, practical papers of a recent date, and ought to prove useful to our correspondent.—ED., *I. A.*

Editorial Notes.

WE have been asked to draw the attention of our readers to the advertisement of the Agri-Horticultural Society's Flower Show which will be found in another column. A schedule of the prizes to be given has been sent to us, and we observe that this year, separate prizes are offered to amateur and professional gardeners. It is hoped that by this means the many skilful amateur gardeners in Calcutta, who have not hitherto cared to enter against professionals, will be induced to come forward and support the Society in this new departure, by sending all they can for competition, and to swell the show. As an incentive to amateur gardeners, Rai Prosonno Coomar Banerjee has handsomely offered a gold medal, for roses grown in Lower Bengal by amateurs—this should draw forth many competitors and prove attractive to rose growers on the lines of railway.

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WITH reference to the reward offered, and advertised for several years by the Government of India, for any process which would render salt unfit for human consumption, but which should at the same time be fit for the use of cattle, the *Englishman* writes :—"We hear that Professor S. Cook has devised a process which fully meets the conditions laid down, but that Government has rejected it on the ground of inexpediency. It is said, however, that Professor Cook will probably claim the reward offered by the Government." The Professor S. Cook referred to above is, we take it, the Professor of Chemistry and Geology in the Poona College of Science ; and if his process meets the conditions laid down by the Government of India, we fail to see why he should be deprived of his justly-earned reward. The plea of "inexpediency" alleged to have been put forward by the Government of India is not quite clear to us, and we must therefore wait for further information before forming an opinion on the merits of the case.

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IT has come to be recognised that something should be done in this country to regulate fishing rights in rivers abounding in the finny tribe especially in Northern India. It is therefore very satisfactory to note that the North Punjab Fishing Club

has taken up the subject of the preservation of fish in the land of the five rivers. Mr. G. H. Lacy, the honorary secretary of the Club, has addressed an interesting letter to our Lahore contemporary on the subject, which we have reproduced in another column.

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The returns of railway borne traffic in the Central Provinces for the quarter ending 30th September 1886 show a considerable falling off in the quantity of goods carried, which amounted to 23¼ lakhs of maunds, being only about one-third of that of the previous quarter. This is, however, not considered as of any importance, as the trade in these provinces always declines very greatly during the rains, owing to the long distances over which produce has to be carried in some districts before it can reach the railway. This is especially the case in Chattisgurh where the export shows a heavy falling off. The imports increased by 134,550 maunds over the corresponding quarter of 1885, and was due principally to the large increase in the importation of salt, and to a development of a traffic in *jauri* with the Berars, where this grain forms the staple produce of the land. A reason for this was that apprehensions were entertained of the failure of the rice crop in some districts of the Central Provinces, but which were removed by a plentiful fall of rain, and accordingly the imports of *jauri* ceased. The exports on the other hand, decreased by over 217 thousand maunds or ten per cent, and were chiefly confined to four of the principal grain crops of the Provinces, *viz*, wheat, rice, gram and linseed. Rice and gram show the largest per centage of decrease. There was, however, an increase in the exports of cotton, *juar* and *bajra*, hides and skins, and *til*. The cotton was sent from the Nurbudda and Nagpore divisions to Bombay ports and other places in that Presidency, and the *til*-seed to Bombay.

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The first report of the Director of Agriculture, Bengal, which has already been noticed by us in a general way, is perhaps the best specimen of the kind we have seen. Mr. Finucane has gone into details, which are of much interest, while the reports of Messrs. Allen and Sen, which are added as appendices, illustrate in a practical and business-like manner the agriculture of the districts to which they relate. Mr Sen's report is a particularly good one, and may be regarded as a monograph on the agricultural systems of the Burdwan Division. It is well written, and while not too technical, is practical and " thorough " in the extreme—just what such a report *should* be. We should like to see more of the same kind submitted by agricultural officers in other parts of India It is not too much to say that the Government of Bengal have a valuable officer in Mr. Sen. We hope to notice in more detail, from time to time, the work done by the two officers we have named.

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In reference to coca leaves, it may interest our readers to learn that a correspondent of the *Chemist and Druggist* has sent to that paper a review of the movement in coca leaves in the Hamburg market during 1886, from which we gather that the stock in first hand was :

	Jan. 1, 1886. Kilos.	Dec. 31, 1886. Kilos.
Bolivian leaves	... 5,680	2,300
Peruvian ,,	... 1,910	4,600
Truxillan ,,	... 6,300	5,700
Total	... 13,890	12,600

The following figures represent the imports and deliveries in 1886 :-

	Arrivals. Kilos.	Deliveries. Kilos.
Bolivian leaves ...	... 22,750	24,620
Peruvian ,, ...	... 35,050	34,570
Truxillan ,, ...	... 29,310	28,810
Total ...	... 87,110	88,000

About 300 bales (representing perhaps 20,000 kilos) passed Hamburg in transit. In the beginning of the year, and again towards its close, business in coca leaves has been very brisk. The United States have been the most important purchasers lately, and the execution of the orders from that quarter caused the article to advance from 35 to 60 per cent. Truxillo leaves are looked upon with suspicion in many quarters, and are commonly denominated " spurious coca"; but recently this variety has apparently found more favour with manufacturers. The bulk of the deliveries went at once into consumption. The lowest quotations of the year were touched in September, owing partly to the accumulation of stock, which then reached 40,000 kilos, partly to the development of the exports of crude cocaine from South America, and last, but not least to the forced sale of a large parcel at about one-half the estimated market value.

The result of the diminished value caused an almost entire cessation of shipments from South America, and at present no further supplies are known to be on the way. The extent of the consumption of coca in Bolivia and Peru may be inferred from the statement made on good authority, that only about one-tenth part of the total crop is exported. The future supply of leaves depends upon the development of the manufacture of crude cocaine in South America. The price last paid in Hamburg for crude cocaine equals 7¾*d*, per gramme, a figure which appears to be remunerative for the Peruvian maker. It is said that several German makers of cocaine have resolved in future to use only the Peruvian crude cocaine, and have made contracts for the delivery of that substance extending over several months. The recent arrivals of crude cocaine show a purer article than the first consignments.

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New remedies are making their appearance every day, especially in the way of powerful 'alkaloids' as they are called. We have scarcely discovered all the hidden virtues of cocaine when another having somewhat similar properties is announced by Dr. John Reid of Germein, South Australia who has published in the *Australasian Medical Gazette* a paper describing a new active principle obtained from the *Euphorbia Drummondii*, a euphorbia growing in abundance in many parts of Australia, and dangerous to stock and sheep. By evaporating a rectified spirit tincture of the plant, adding ammonia, and separating the precipitate by filtration he obtains an " active principle " which he names *drumine*. The precipitate is dissolved in dilute HCL, the solution filtered through animal charcoal, and the filtrate slowly evaporated leaves a fairly pure hydrochlorate. Its aqueous solution is colourless and nearly tasteless. It is almost insoluble in ether, freely soluble in chloroform and water, and these solutions deposit readily microscopic, acicular, and stellate crystals. Whether the principle is an alkaloid is doubtful. The therapeutic effects are very marked. Dr. Reid's experiments upon cats and on himself show that solution of drumine either injected or ingested has very striking anæsthetic properties. An injection of 4 minims of a 4 per cent solution quickly relieved a case of chronic sciatica, and a second injection effected a cure. It relieves cases of sprain so promptly that lead lotions will be forgotten. Dropped in the eye it produces insensibility of the eyeball and relieves tic. Placed on the tongue it produces anæsthesia and loss of taste even to quinine.

A Native correspondent, T. R. Chowdhery, has been addressing letters to the three local 'dailies' in reference to the remark made by the Director of Agriculture, Bengal, that Hindoo agriculturists were begining to appreciate the advantage of utilizing bones as manure, instead of allowing such a valuable substance to go to waste. The writer appears to be very indignant at this remark of the Director. In his last letter to the *Englishman* T. R. Chowdhery says :—

You advocate the use of bone meal, and praise the exertions of the Agricultural Department to disabuse the minds of the cultivating classes of their religious scruples. I consider it, therefore, my duty to record my dissent in this matter. What has surprised me and my co-religionists is that a question which still remains to be decided by courts of justice should be made the subject of recommendation both by the Director of Agriculture and the leading newspapers. I am quite sure it will take at least some decades for Western ideas about the harmlessness of bone-meal as manure to percolate to the

general bulk of Hindoo agriculturists. The possible, says the metaphysician, will, in time, realize itself, and it may therefore be hoped that the expectations of the Director of Agriculture will some day be fulfilled, but this much at least is certain that the Hindoos have still too great a regard and veneration for their religion to give their eternity to the devil, and sell cheaply their share in Paradise. People with reformed ideas of religion may write about bone meal and invest it with an air of sacredness, but for a Hindoo to manure his crops with it, to the great detriment of his religious sentiments and in the face of the time-honoured traditions of his country, and all for the sole purpose of reaping a plentiful harvest, is in the language of the poet, " to play the Mammonite mother who kills her babe for a burial fee." Such is the feeling of all true Hindoos in respect of bone-meal, and the Pundits who have been triumphantly cited as having declared it pure are to them no better than enigmas. They have either no sympathy with their religion or have not taken the trouble to turn so much as one poor leaf of the *Shastras*. At all events I can assure you that the report of the Director of Agriculture and the many eulogies sung in honour of bones and bone-meal are not the swan-song of old dying Hindooism.

Anything more 'boshy' it has seldom been our lot to peruse; what, we ask, has the use of bone-meal as an application to the soil to do with 'eternity,' the 'devil' and 'paradise'? That the writer is a well-read man we have little doubt, and it is therefore lamentable to see a man of learning writing in such a silly and puerile strain as T. R. Chowdhery has adopted, while his arguments against the use of bones as manure are as void of logic and common-sense, as they are misleading. Does he not know that the material for the formation of those very bones was originally taken from the soil in the shape of lime? That we should return to the earth what we take from it? Is he so ignorant of the divine law that *all* flesh *must* return to the earth whence it came? The earth is continually being exhausted of its nutriments, and if they are not returned in some form or other, exhaustion of the soil must take place. What is there more objectionable in the application of bones as manure than in cowdung? We are apt to lose all patience with writings of the kind T. R. Chowdhery has indulged in, especially as it is the work of a man who lays pretensions to book learning and enlightenment. Nothing more fallacious could be put forward as an argument against the use of bones as manure, and those of the cultivating classes who have resorted to the practice have a far better notion of the eternal fitness of things than T. R. Chowdhery, and are to be congratulated upon their foresight and common-sense.

THE following is the official Summary of the reports on the State of the Season and prospects of the crops for the week ending 26th January 1887:—Rain has fallen in Bengal, the North-Western Provinces and Oudh, and Assam. Slight showers have also occurred in the Punjab, Central Provinces, Central India, and Rajputana. Except in Bombay and the Central Provinces, where slight injury has been caused by blight, rain, and hail, the *rabi* crops throughout the country generally are in good condition and have benefited by the late rainfall. In Madras the general prospects are favourable, though rain is needed in Madura, Chingleput and Coimbatore. The rice harvest in Bengal has been completed and the outturn is satisfactory. In Burma the harvest is well advanced. Poppy continues to thrive in the North-Western Provinces, but in places in Bengal the plant has been injured by rain and caterpillars. Coffee-picking in Coorg continues and the season is favourable. The public health is generally fair. Fever and smallpox prevail in certain districts of the Bombay and Madras Presidencies. Prices are fluctuating in two and rising in three districts of the Punjab, and are rising in three States in the Rajputana Agency; in Mysore they have fallen in two districts; elsewhere they remain generally stationary.

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THE well-known American story about a wonderful sausage machine in which the pig entered at one end and came out as ready made sausages at the other, is almost equalled by the following, related by a journal published in the town of Meridian, Miss. U. S. A.:—There is a paper factory in Augusta, Ga, which has been in operation about twenty years. The paper is manufactured out of common old field pine. Poplar wood makes the best paper of that kind. The pine grows in abundance out there, and costs only about one dollar and fifty cents a cord. This paper contains about sixty per cent of wood, and is the paper that is used by the newspapers generally throughout the South. The land on which this wood is grown is worth but little for agricultural purposes, and can be bought for two or three dollars an acre. There are several kinds of paper manufactured at this factory and it is sold under the New York market prices. This paper can be made cheaper and placed in the market at lower rates than the same kind of paper produced by any northern manufacturer. The wood is ground up in the mills and the paper is made by a simple and inexpensive process. A pine tree can be cut down in the morning and at six o'clock in the evening of the same day it will be manufactured into paper ready for the press, and the local paper will appear next morning printed on paper the material of which was a tree twenty-four hours before. In this way the forest can be turned into newspapers as rapidly as may be desired. The market for this paper is chiefly in the south; but a considerable portion of it goes to the north. We think there would be an opportunity for such a factory in Meridian. There is a good supply of pine wood around our city, we have abundance of cheap labour here and our advantages as a distributing point are beyond question. If the right men would start such a factory, and take proper hold of it, they would make it a success. We want diversified industries to build up our city. It is time that our prominent citizens should extend a helping hand and set the car of industry in motion.

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THE Agri-Horticultural Society of Madras must be congratulated upon having submitted a very interesting report for the period 1883 to 1885. That the Society has done a great deal of good work will be admitted after a perusal of the report which we reproduce in another column. Of the help given by the Society to Government, the Director of Agriculture writes "The Agri-Horticultural Society of Madras have, on all occasions on which they have been applied to, readily favored this department with their co-operation, and that this department has, whenever possible, freely utilised their services in the matter of procuring, raising, and distributing seeds and plants of great economic value. Besides supplying seeds of *Reana luxurians*, *Divi divi*, and of varieties of well-known foreign tobacco, the Committee of the Society have procured shoots of the edible cactus from Malta, planted them first in their own gardens and distributed them to the districts after they had become well established. The Society has also furnished valuable information and suggestions to this department on the subject of grafting the edible cactus on the common variety and on that of indigenous salt plants for the reclamation of salt soils. All that is stated in the report as to the utility of the Society to the general public of this Presidency seems to me well warranted. The Government of Madras, in reviewing the report under reference, observe :—" Altogether, the period under review seems to have been of an increased activity and usefulness, and the Government desire to place on record their sense of obligation to the Honorary Secretary and the members of the Committee, to whose exertions this desirable result is mainly due."

WE have heard many artificial substitutes for the genuine article, but never anything equal to the startling announcement made by a Yankee exchange of *Meerschaum pipes being manufactured from potatoes*! But such apparently is the fact, as a perusal of the following from the *Southern Trade Gazette* will show :—" A dealer in fine articles of smokers supplies has furnished a pipe purporting to be made of meerschaum, but its analysis shows the unmistakable evidence of vegetable origin. This class of goods, quite recently found at a trifle discount in the market, are made of potatoes. If we place a sound freshly peeled potato in sulphuric acid and water, in the proportion of eight of acid to one hundred parts of water, allowing to remain in this solution, say thirty-six hours, it will turn right black It is now well

dried by means of blotting paper, subsequently subjected to hydraulic pressure when a material is produced that can be readily carved, and experts are unable to detect from genuine meerschaum. This counterfeit is an excellent smoker. It absorbs the nicotine and colours beautifully, and even ivory may be closely imitated in the same way. We have a set of pool balls made of this substance that, to all intents and purposes, are equal to ivory, while if we take common red carrots and treat them in the same manner as the potato, a perfect imitation of the finest coral is the result. We are told that an Eastern firm is making a full line of imitation goods in this manner, and those who have used them claim that in very many respects, the counterfeit is to be preferred to the genuine and our observation corroborates it."

The above shows to what uses our commonest tuber can be put. We may soon expect to hear of potatoes being cultivated for the manufacture of meerschaum pipes !

MANURING CINCHONAS.

We have already drawn attention to the results obtained by manuring cinchona trees. The report on the Government cinchona plantations on the Nilgiris stated that the effect of manuring some *succirubra* and *magnifolia* trees about six months before taking bark for analyses, was to increase in each instance the amount of total alkaloids in the bark, while the genuine, the most important feature, increased by 52 per cent in the first named variety, and 20 per cent in the other. The manure used was cowdung. What appears to us curious is, that it should never have been thought of before to manure cinchona trees. Any way, the subject has now attracted attention, and we are very glad to see that Messrs. Arbuthnot and Co., of Madras, have taken up the question, by addressing an opportune and practical letter to the Government of Madras on the subject. After referring to the report of the Director of Government Cinchona Plantations for 1885-86, Messrs. Arbuthnot and Co., write :—

" We observe that the experiments in manuring cinchonas in order to ascertain the effect upon the alkaloids were on a very small scale, and that the Government, in its order of 15th instant, express the desire that investigations should be continued with trees of other varieties. We venture to suggest that experiments should be conducted upon a far larger number of trees, and if a selection of any particular varieties is to be made for the purpose, that it shall include *C. Succirubra* and *C. Robusta*. We propose ourselves to experiment upon *C. Ledgeriana*, both with cattle and other manures. It occurs to us that since the date of the Director's report further experiments in manuring may have been conducted and the results ascertained, and if so, we should be very glad to receive particulars. We may mention that mainly influenced by the advices of the Director's letter of 9th November 1885 to the Collector of Malabar, we have abstained from manuring our cinchonas (though recommended by planters to do so), as according to that letter experiments made up to that date had shown that the yield of alkoloids per pound of bark was *not* increased by manuring. We therefore have the honor to request that Government will obtain from the Director or the Quinologist, as the case may be, and communicate to us the expression of his opinion whether, taking into consideration the views held in November ot last year, and the result of the experiments conducted in the past season, he would recommend manuring of cinchonas from a commercial point of view, and if so, whether cattle or artificial manure would be the more beneficial. If he be of opinion that the latter is the more desirable, we should be glad to know his views as to what components would be the best. Possibly the investigations of the Government Quinologist into the inorganic constituents of cinchona bark may have arrived at a sufficiently forward stage to indicate the class of manure that would have the greatest effect in increasing the quantity of alkaloids." Mr. Lawson, in charge of the Cinchona Plantations, who was asked to report on the above letter, has stated that he is at present carrying on extended experiments as to the value of different kinds of manures, and that the first harvesting of the manured plots will take place in April next, after which the bark will be analysed, and any information will then be communicated. With regard to Mr. Hooper's report on the inorganic constituents of cinchona bark, which was noticed by us some little time back, Mr. Lawson says it was the first of a series of analyses which he is engaged upon, the result of which will be communicated to Government in due course. We shall therefore await these two communications with interest.

GARDEN SCHOOLS.

I.

[By R. B. West.]

TO THE EDITOR OF THE " STATESMAN."

Sir —The question of technical education is one that is gradually but surely pressing itself forward, and sooner or later must be seriously considered by our rulers. Undoubtedly during the past twenty or thirty years much has been done in promoting the education of the masses in this densely populated country, but here the question arises : Has our progress been in the right direction ?—has the form of instruction imparted been the best adapted to the requirements of the people ? India is essentially an agricultural country, and yet how little has been done to promote its interests. We have certainly provided or are providing cheap railway communication, and have opened our ports for the free export of its produce ; but is this all that is necessary ? A very able writer has said " that man is a benefactor of his species, who can induce two ears of corn to grow where but one had grown previously," has any attempt been made to do this ?—have we endeavoured to introduce the many and varied improvements in the culture of the soil now almost universally adopted by other nations ? No ! We have been content to let that great majority of our population, " the tillers of the soil" who really represent the wealth and prosperity of India, remain in the same degraded state of ignorance as their forefathers. True, we have our Agricultural departments, which perhaps do some useful work in the compilation of statistics and preparing forecastes of crops, but all this benefits the consumer far more than the producer. We have one or two model farms which have no doubt exercised a favourable influence within a limited circle, and we can also boast of one Agricultural College amongst a population of upwards of two hundred millions. This with the exception of holding local fairs or exhibitions in perhaps half a dozen districts, is all that is being done to develope the interest of agriculture. Let us now see what is being done by other countries. The Public School Law passed in Austria in 1869 provides, that " in every school a gymnastic ground, a garden for the teacher, according to the circumstances of the community and a place for the purpose of agricultural experiments be created." The school Inspectors of each district are instructed " to see, that in the country schools, school-gardens shall be provided for instruction in all that relates to the soil, and that the teacher shall make himself skilful in such instructions." The general law declares that " instruction in Natural History is indispensable to suitably established school gardens. The teachers must therefore be in a position to conduct them."

The German word " kindergarten, " as well as the method of instructing quite young children associated with it, is already tolerably familiar in this country. Briefly, it is an instruction to assist in and complete the bringing up of children, who are yet too young for regular school duties. True, it may include among its devices a small garden to promote observation and industry in its infant wards ; but the school garden, as understood in Austria, is a real garden attached to the school, and forming part of the school. In an article on this subject in the *Neue Freie Press*, the writer, who it would seem is an enthusiastic promoter of this scheme for imparting practical instruction, gives us his ideas on the uses and scope of the school garden. He states that in a small district of Silesia 245 schools have gardens attached, thirty-six of which are worthy of notice and of recent date. Many of the older ones are undergoing re modelling, and six new ones are in the course of formation. Moravia and Bohemia are active in the movement, and Galicia already possesses a considerable number in some of the provinces. In a few years the provinces of Mieleo and Iaroslav will be dotted all over with school gardens. In Steyeramark, again, a great many have been formed, and no fewer than forty two through the exertions of the Agricultural Society. In the capital little has yet been done in the matter, but recently the town council has resolved that they shall be established wherever the requisite space can

be obtained. Seeds in all cases are supplied free from the National Botanical Gardens. Of course the designs and arrangements should always be made subordinate to local conditions and circumstances. Thus in a large town the requirements and the space generally available are usually widely diverse from those obtaining in a small country town. Again the class of school and sex of the scholars, have to be taken into account, as well as the resources of the establishment in question. In all cases the natural capabilities, extent, capabilities and quality of the soil must be carefully considered. In short, no uniform plan can be carried out, for the conditions of a fertile plain are widely diverse from those of a barren mountain valley, and the same may be said of different altitudes. But even under the most unfavourable circumstances, the indigenous vegetation of the district should be illustrated, as well as the cultivated cereals, fodder plants, aromatic and medicinal herbs, vegetables and fruits of all kinds. The poisonous plants, particularly of the neighbourhood, should be cultivated in order to make them familiar to the scholars. Ornamental shrubs also demand attention where there is room for them, and in larger gardens representatives of the native forest trees should be placed for shade on the playground or the gymnasium. A garden thus formed, according to the space at command, offers children the facilities for observation and is a rich source of pure delight. Moreover the knowledge gained by children in this practical manner—and in a well conducted garden is varied and valuable—is permanent; they may forget what they learn, but not what they experience. This and much more the writer says in favour of the school garden.

II.

SIR—One of the principal advantages of the school garden, besides affording pure and healthy occupation and pleasure, is, that under proper tuition it induces habits of observation and independent thought. Qualified teachers speak very highly of the aid afforded in general education by the school garden, as well of its elevating influences on the minds of the children. But it should be remembered that the school garden is not an entirely new idea. For more than a hundred years, energetic school masters have been trying to carry out the system, but simple as it is, they have not got beyond theory, having stuck fast in their search for a model which should be of universal application. In 1881 Sweden with its 7,528 free or national schools, possessed upwards of 2,000 school gardens, Germany possesses a system very similar to that adopted in Austria. France has carried out the idea even on a broader basis, for, in addition to making agriculture (and in many cases horticulture also) a compulsory subject in all schools in rural districts, she has besides established special "Farm schools," where free instruction is imparted, and these are again headed by central agronomical stations where farmers can have soils, manures, plants, &c., analysed for a very small fee; there are also plots of ground attached to these "field laboratories" where purely scientific agricultural problems are solved by direct experiment.

It is evidently only a question of time for a similar system to be introduced in England, for public opinion is already prepossessed in its favour. A leading agricultural journal in discussing the subject, remarks that "Practical cultivation by what we may call the rule of thumb, is as perfect as it can well be, it is difficult to imagine anything better in its way than the practice of an experienced and intelligent first class farmer or gardener. It is hardly likely that much further progress can be made in this direction. New ground must be broken, fresh experience sought and obtained. Masters and men must be more thoroughly educated, more carefully trained: *and the education and training must be special.*" "Does it not seem extraordinary," says Sir John Lubbock, "that in such a country as ours there should be only one school devoted to agriculture; that we should have no forest school, so that the young men who are going to be placed in charge of our great Indian forests have to learn their business in France or Gemany, that no instruction is given in agricultural matters in any of the schools and colleges to which our landed proprietors send their sons; and that the Education Code practically excludes all elementary instruction in the processes of agriculture, the nature of soils and the care of domestic animals, from our country village schools?" It does indeed seem extraordinary, seeing that we call ourselves a practical people. Of such and similar institutions, America boasts scores. Germany has them in abundance, France has them, Belgium makes them part of her university curriculum. France has quite recently established a chair of Vegetable Phisiology at the Jardin des Plantes. The countries we have named are right and we are wrong. We are tamely letting them get the better of us and complaining of bad seasons and hard laws, all the time doing next to nothing to meet the altered circumstances. The rural schools should furnish the basis not only of a common education, but also such a knowledge of the soil, the air, the waters the plants and animals as may be made available in the daily routine of the farm or garden. We cannot too emphatically repeat our conviction, that progress in agriculture and horticulture in the future depends far more on the results to be got from a thorough training in the various branches of natural knowledge than it does in any readjustment of land-laws or lightening of fiscal regulations. These are as it were local accidents—limited in their area, restricted in their range, but nature is universal, the application of a knowledge of her laws to the business of life is limited only by the finite faculties of man.

But the other day we learnt from one of the Government Inspectors of Schools that one of the schools under his examination had a master who taught the boys elementary gardening being himself an enthusiastic amateur gardener; "and" said the Inspector "this is one of the best schools in my district." Of course it is not to be assumed that this increased intelligence grew solely out of the gardening teaching; the same results would no doubt have followed from the teaching of any other trade or vocation, simply because the half-hour now and then devoted to such work becomes not only relaxation from mental studies, but acts on a diverse set of intellectual organs, thus recreating yet instructing. It is the exceeding monotony of our present mode of inculcating knowledge that turns so many fairly intelligent children into dullards. Objects of any kind used in teaching must exercise the same influence that pictures do,—they bring nearly all the brain organs into equal play, and the risible as well as the intellectual organs are often equally excited. Put in this way, much might be done in imparting a knowledge of plants, fruits, seeds, insects, vermins, birds, and myriads of things that it would be of real value they should know something about, and especially those whose vocation in after life may be associated with the soil. A portion of the time spent in elementary schools on such subjects as grammar and history, drawing, electricity, or whatever subject the taste or whim of the teacher may lead him to take up, might be more profitably employed in showing the future agriculturist that his work demands the exercise of intelligence and skill, and that the application of these qualities would certainly make his services more valuable. The very fact that is admitted on all hands, that the most intelligent inhabitants of rural districts invariably look townwards, or to other employments for more profitable occupation, shews that there is something about their training and circumstances radically wrong. Is the school garden worth thinking about—worth trying? Some time, perhaps before the century has closed the vast overgrown centres of commerce and manufacturing industry will begin to feel the pressure of foreign competition, to say nothing of the exchange question, and an anxious legislature will awake to the consciousness that there are millions of acres now actually barren that could be brought under cultivation, and that even the land under tillage might be brought to yield twice as much as it does at present, through more sensible and thorough cultivation. It is a lamentable fact that in a country so well adapted for vegetable culture as India is, three-fourths of its population never get any thing beyond what may be termed weeds, found in an uncultivated state; and even possessors of gardens have but little knowledge as to how good vegetables should be grown. Natives as a rule, plod on year after year growing what their ancestors grew; they seldom get a word of advice in a plain practical manner, as to what is good or what is bad in the way of either plants, vegetables or fruits.

SUGARED CEMENT.

IT is astonishing what an amount of valuable evidence can be called forth by a little sentence. If we remember rightly some one made a casual remark that a new use for sugar might be found in its combination with lime adding that it tends to add stability to cement thus prepared. The following extracts on this subject are interesting:—Mr. Thomson Hankey of Tunbridge, writing to the *Times* says:—

"My attention has been called by a gentleman, well known in the scientific world, to a new use for sugar, which at the present low price of that article might be capable of being practically applied. Experiments have recently been made proving that sugar is a valuable ingredient in mortar and cement, having strong binding qualities. Equal quantities of finely-powdered lime of a very common kind were mixed with an equal quantity of good brown sugar with the addition of water, and the result was a cement of exceptional strength. This has been tried at Peterborough Cathedral, two large pieces of stone of the broken tracery of a

window having been joined firmly together by sugared mortar. The severest test is joining glass, which gives no hold to mortar without the use of sand, and this has been successfully done. The fact appears to be certain that sugar produces an extraordinary effect on lime when the latter has been allowed to fall into a fine powder, and has been thoroughly slaked. Particles of unslaked lime would destroy the result, because of their expansion, which would make the mortar lift. The sugar mortar thus made will be found, I believe, to be as good as Portland cement, and the only question therefore would be one of cost; and it is probable that Portland cement itself would be made much stronger by the addition of sugar. Treacle might have the same effect. It is not necessary to mention in detail the numerous small experiments which have been made. It was a matter which anyone can test for himself by joining bricks with Portland cement alone, and by joining others with sugar and water added to cement. The fact that cane sugar and lime form a definite chemical compound has long been known. It is used, indeed, for various purposes, and it may be hoped that the suggestion of its use as an ingredient in mortar may be turned to practical account by builders and cement manufacturers. It has been suggested to me that the use of sugar is the secret of the success of the old Roman mortar."

The following letters are from the *Times* of October 16. Surgeon-General W. Robert Cornish, writing from 8, Cromwell-gardens South Kensington says:—

"Allow me to point out that the use of sugar in this way is by no means so new as Mr. Hankey supposes. In India the practice of mixing 'jaggery,' or unrefined sugar, with mortar, in certain proportions, is a very ancient one. In the latter part of the last century, when Hyder Ali's horse threatened the settlement of Madras, the townspeople were called upon to build a wall to keep the intruders at bay. This wall existed until 1859, when Sir Charles Trevelyan, the then Governor, had it removed with the view of bettering the sanitation of the town and providing for its extension. But so firmly was the brick-work held together that the greatest difficulty was found in the demolition of the town wall, and the separation of the bricks old from the mortar was quite impracticable. In examining some records about fourteen year ago I came across the original specification of the Government for the composition of the mortar with which the town wall was to be built, and the specification included a certain proportion of 'jaggery' to be mixed with the shell lime and river sand. I sent the receipt to the *Madras Mail* newspaper, in which it was published, I think, in 1873. The polished 'chunam' walls, for which Madras is famous, are prepared with cement made with unrefined sugar."

Mr. Nathaniel Stevenson, writing from 51, Wimpole street, Cavendish-square, W., says:—

"I have used about an ounce of brown sugar to a half pint of the water used in making plaster-of-Paris models. These models are certainly smoother and much harder and therefore far less liable to damage than others. I find this is of special advantage in working vulcanite, &c. This is not generally known and it occurs to me that, if it was, it might benefit not only the sugar trade, but also many other kinds of industries."

RAJ, writing, says:—

"Sugar in its coarse state called *goor* has been used in India from time immemorial and its value as an ingredient in mortar is exceptionally great. Masonry cemented with this mortar I have known to defy every effort of pick and shovel and to yield only to blasting when it has been found necessary to remove old *pucca* buildings."

In addition to the proposal to use sugar in cement or mortar, *Public Opinion* speaks as follows of sugar as an anti-incrustator in steam boilers.—

"The last number of the *Rivista di Artiglieria e Genio* contains a brief but important article by Colonel Agostino Polto of the Italian engineers giving the result of certain experiments carried out by him with common sugar as a remedy for preventing incrustation in boilers. The boiler made use of by Colonel Polto was a 20—horse power field tubular boiler containing 126 tubes. This boiler was ordinarily scraped and cleaned out every forty-five days (*i. e.* after 380 working hours) when the average weight of scale removed after making use of the best methods known for preventing incrustation amounted to 12 kilogrammes. Before beginning the experiments with sugar, one-third of the tubes were purposely left uncleaned: the boiler was than filled with water and 2 kilogrammes of sugar added to it: a further supply of one or two kilogrammes alternately, being added every seven days. After working the boiler for the usual forty-five days it was found that it could be cleaned easily without the necessity for scraping it and that the tubes which had been left uncleaned were considerably more free from scale than before, whilst the other tubes remained clean and bright; about 8 kilogrammes of old incrustations were found at the bottom of the boiler, having become detached by the beneficial action of the saccharine solution."

AGRI-HORTICULTURAL SOCIETY, MADRAS.

The following interesting report on the working of the above Society has been submitted to the Government of Madras by the Honorary Secretary Mr. Joseph Steavenson, and embraces the period from 1883 to 1885:—

The facts set forth in the last triennial report to Government, dated 12th January 1883, No. 28, being true now as then, the Committee think that as this report must necessarily contain much repetition, I cannot do better, for the sake of brevity and convenience, than follow the form then used. Since the report above referred to, which related to the period 1879 to 1882, inclusive, the Society so far from relaxing its efforts to carry out its self-imposed task has materially increased them as appears from its enhanced receipts in all branches, and more especially from its growing correspondence. The letters recorded in the office books, which may be taken as a fair criterion of the Society's business, have increased from 955 in 1877, when the present Honorary Secretary took charge, to 1734 in 1885, and promise a still higher increase in the current year.

During the years 1883, 1884, and 1885 the Society has introduced, experimented with or distributed large numbers of the plants referred to and particularised in paragraph 2 of the last special report, including many interesting for their curious, ornamental botanical or economic value, and amongst them two which call for special mention, namely, *Cyphomandra betacea* and *Erythroxylon coca.* Seed of *Cyphomandra betacea*, "the tree tomato," was received from Mr. Morris of Kew, then head of the botanical department, Jamaica, and the plant has been established amongst the Society's correspondents on the hills and plateaus of southern India. *Erythroxylon coca* was largely propogated from a single specimen in the gardens as soon as the merits of Cocaine attracted public attention, and has been widely distributed amongst planters and others in various parts of the country. The extensive growing and distribution of fibre plants, valuable timber and fruit trees, rubber, drug and tan producers has continued and increased. In 1883-85 the Society raised and sent out 117,640 rooted plants of *Fourcroya gigantea* alone for fibre-growing experiments.

Besides specimens of new and rare plants for garden cultivation large numbers of young trees and other plants of indigenous or established kinds have been supplied to municipal commissioners local fund boards, and other authorities for plantation, avenue and hedging purposes, being often sent long distances where facilities of rail or water-carriage sufficiently reduced the cost of conveyance.

The implements mentioned in paragraph 3 of the last report continue to be distributed; gardeners are obtained for members of the Society and others in Madras and elsewhere, while boys trained in the gardens easily find places: and the services of the superintendent have several times been lent to lay out the grounds of public institutions in Madras.

The magnificent botanical collection belonging to the Society continues to be added to by the liberality of correspondents in many parts of the world, and by the Society's own collectors. The scientifically-arranged botanical garden is in good order and is largely resorted to by students and others. The efforts of the Society to diffuse information have been sustained, the correspondence, as stated above, having largely increased, and the monthly proceedings of the committee continuing to be regularly printed and more and more widely distributed to members, to the press, to kindred societies and bodies, and to persons interested in the various subjects to which they refer. In 1884 a complete and useful list of plants to be found in the gardens and neighbourhood was compiled by the superintendent of the gardens, printed and largely circulated.

The Society's library has, with the assistance of a liberal grant from Government, been much improved by the additions of many valuable works of reference, and is consulted by visitors, who are freely admitted, whether members of the Society or not. The gardens are open to the public from sunrise to sunset; botanical specimens are given, whenever asked, to local professors and lecturers and to scientific visitors; and the library and botanical garden are believed to be of great service to the students of the various botanical classes.

The society continues to act and be largely employed as an agency through which persons at a distance obtain supplies of fruit,

avenue, shade and other trees, plants and seeds; and annually obtains and forwards to all parts of India, and often abroad, large numbers of grafted mango and other trees and seeds of useful plants, such as Inga dulcis, casuarina, cotton, tobacco, senna, forage plants, fibres and cereals, In the last number of the *Journal of the Agricultural and Horticultural Society of India*," page 325 it is stated by Mr. Maries, a recognised authority on the mango, that "The grafts made by the Madras Horticultural Society are the best I have seen in this country." The Society is often honored by references from Government and the Board of Revenue for information on horticultural and kindred subjects and is frequently able to be of use to commissioners, collectors, and other authorities in this presidency and distant provinces.

On 15th July 1885 the Society completed the fiftieth year of its labors; and to quote from the last annual report—"The half century nobody familiar with the Society's gardens and their very great wealth in exotic plants collected from every quarter of the globe would suggest has been spent in sloth. Horticulturist in Madras are apt to forget, and those who are not horticulturists are probably ignorant, that for many, possibly, most, of their handsomest herbaceous plants, trees and shrubs they are indebted to the Agri-Horticultural Society; and that for that reason, as well as others, the Society deserves their support in both subscriptions and contributions. Observers, not, scientific botanists, are now so accustomed to the great variety of vegetable life which beautifies Madras and its suburbs, and makes gardens and roadsides interesting, that the time, labor, and money expended in their collection from every country within the tropics and many without, escape their memories, as do the nursing and propagation by skilled hands in, and liberal distribution from, the Society's gardens. Many of the most useful and commonest plants of the hedgerow now annually sowing themselves and reproducing their kind in spite of never ceasing cropping and browsing by voracious goats and their hungry owners, but for the Society and its correspondents, would not have wandered here from their distant homes in other parts of India, in Africa, America, or Australia. The committee think that the past and present members of the Society may look around and congratulate themselves that their first fifty years of association have been well spent."

The monthly proceedings of the committee, which are regularly forwarded to several departments of Government, detail the more important work done; the whole work of each year is briefly stated in the reports annually laid before the general meeting of the Society, the last three of which are submitted herewith.

The following table shows the income and expenditure of the Society since the last triennial report to Government up to the end of last year:—

Year	Monthly grant [illegible]	[illegible] for prizes for special products	Extra allowances from [illegible]	Grant from Government for [illegible] botanical works for the [illegible]	Members' subscription.	Sale of seeds, plants, &c.	Total receipts.	Total expenses.
	Rs.	Rs.	Rs.	Rs.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1883 ..	3,000	500	500	..	2,353 6 0	9,189 14 7	15,57[illegible] 6 7	11,184 11 2
1884 ..	3,000	500	500	1,000	2,371 7 8	2,686 0 0	16,107 7 8	15,561 11 1
1885 ..	3,000	500	500	..	[illegible],500 0 0	10,901 1 7	17,401 1 7	17,627 7 7

The Society continues to have the benefit of the long experience of the Honorary Secretary who has managed its affairs since 1877, and has now, in addition, the able assistance, as superintendent of the gardens, of a professional gardener who was sent out to Government from Kew in 1870 to conduct experiments in the cultivation of cotton in the Central Provinces; and the committee believes that its usefulness and the importance and extent of its work is limited only by the funds at its disposal and the small amount of time which the Honorary Secretary is able to devote to it from his other duties.

The remark made by the Director of Agriculture, Bengal, that Hindoo agriculturists were beginning to see the fallacy of wasting bones, and were now using bone-meal in manuring their field, has led to some controversy in our local prints. A correspondent (native) of the *Englishman* writes on this subject: "I can assure you that the report of the Director of Agriculture and the many eulogies sung in honour of bones and bone-meal are not the swan songs of old dying Hindooism."

Miscellaneous Items.

On the subject of the Ostrich farming, a writer says:—"Attracted by the profits that have been derived from the rearing of ostriches and the sale of their feathers, enterprising individuals have at various times exported these birds from the Cape of Good Hope to such divergent quarters as India, South Australia, the River Plate, and New Zealand; and in all these, it is said that the birds are thriving, notably so in the last-named colony, from which a first consignment of feathers was recently brought to England. The Cape will therefore no longer be able to boast of monopolising this industry.

Mr. G. W. Griffin, the United States Consul, in New South Wales, has just returned from a visit to America, where he took the opportunity of bringing several matters of interest to the colonies to the attention of the Government at Washington. He strongly impressed upon those in authority the desirability of establishing reciprocal relations between the States and the Colonies, in consequence of which the American Government has promised to actively take up the question of remitting the duty on Australian wool. Efforts will also probably be made to ensure the abolition of the sugar duty.

At the last meeting of the Nilgiri Natural History Society, Mr. D. Hooper, the Government Quinologist read a note on the sting of the Nilgiri nettle (*Girardinia palmata*). This nettle yields a useful fibre, but from the number of stings that clothe all parts it is very difficult to collect it. The stings, or glandular hairs, resemble in shape those of the common nettle (*Urtica dioica*). They leave no embrasure of the skin or dangerous symptoms the next day. The result of Mr. Hooper's examination of the secreting fluid of the sting is that he has found it to contain formic acid, the body to which is due the irritating effects of the sting of such insects as red ants, bees, and mosquitoes. As the nature of the sting of nettles has been a point of uncertainty, Mr. Hooper's observation is of considerable interest.

Selections.

THE OTTO OF ROSE INDUSTRY.

Mr. Ernst Schmalfuss, a German horticulturist, has been spending a considerable time in Bulgaria to investigate the conditions of the otto of rose industry in that country. Mr. Schmalfuss went to Bulgaria as the agent of a German firm of essential-oil distillers who have lately been endeavouring to create an otto of rose industry in Germany, and who desired to have an expert's opinion on the question whether it is feasible to grow the Thracian rose in Western Europe.

The information which has been collected belongs of course to the firm who bore the expense of the journey, but Mr. Schmalfuss has obtained their permission to publish certain details on the subject of his investigations. Mr. Schmalfuss went to Bulgaria with an open mind, and returned thence a firm believer in the future of an otto industry in Western Europe.

There are two principal rose growing districts in Bulgaria, the one extending from Yeni Sagra to Car'owa on the southerly slopes of the Balkans, and the other situated near Chirpan, south of the Karadsha Dagh. The most widely different estimates prevail regarding the total area under cultivation, and no reliable figures are obtainable. There is much variation in the soil of the rose districts, the prevailing formation being a light loam, rich in lime (1·26 per cent) but almost devoid of phosphoric acid, of which only traces were found in a sample sent to Germany for analysis.

The proportion of nitrogen is moderate, being 0·14 per cent, but the soil is remarkable for its richness in potassium, of which 0·64 per cent was present in the specimen analysed. It is not known whether the presence of potassium exercises a special influence on the growth of the flowers; if so, the application of potash-manure would be advisable. In Bulgaria the rose-fields are sheltered from the north wind by the mountain ranges against which they are situated, but it is thought that it would be rather an advantage than otherwise if they were from time to time exposed to a cool wind, the plants being singularly hardy and able to withstand without injury a temperature of 4° Fahr. On the other hand, scarcely a season passes in which the plants do not suffer from excessive heat, the high temperature prevailing during certain months being, in fact

the greatest enemy of the shrubs during the flowering and gathering time.

The variety which is used for distilling purposes in Bulgaria is the so-called Thracian rose, a plant of exceedingly rapid growth, flowering sparingly in the first year, and yielding a full crop in the third, when it attains maturity. It is said that, under certain conditions, the plants attain an age of fifty years. The plant bears red or white flowers, the former being about five times as numerous as the latter. Both varieties of flowers are of a very powerful and agreeable odour, but the oil distilled from the white flowers is the finest, although the red roses are richer in essential oil. The Thracian rose exceeds all other varieties in flowering property, weak specimens bearing as many as 500 flowers, while fine plants if properly cultivated, are able to produce nearly double that number. The roses are small and light, about 220 fresh flowers going to th lb., or about twice the number of ordinary centifolia, flowers whic are required to make up that weight.

The flowers of the Thracian rose are rather thin, and their richness in essential oil lies in the ovary and th stamens (of which there are an extraordinary number), rathe than in the petals. For distilling purposes the entire flower of th Thracian rose is taken, while of the other varieties the corolla leaves alone are employed. Almost every small Bulgarian farmer distills his own oil, the stills used being of the most elementary description, and it is thought that if a Western firm were to undertake the distilling a larger percentage and better quality of oil might easily be obtained. The roses are grown in fields, where they are placed in rows about 2 yards apart, and alternating with rows of grape vines or kitchen vegetables. To a practical man it would appear that in the Bulgarian fields the plants are grown too closely together and have no room left to expand properly. As hints to intending experimenters in Western Europe, Mr. Schmalfuss recommends that the soil should be well manured with old partly decomposed manure, the application of which should be repeated every third year. The plants should be placed in rows, about 8,000 trees to the acre, and during the first two years the rows of rose-plants may alternate with rows of kitchen vegetables. It may be found to pay to cut the shrubs in the second year close to the ground. The yield of that year is of course lost by this proceeding, but the luxuriance of the plant for the future is thereby much increased. After the third year the planting of vegetables must be discontinued. The soil must be kept free from weeds and rendered loose twice a year by hoeing. The fields might experimentally, be protected at the north side by hedges. The flowers must be gathered early in the morning and placed loosely in open baskets, which should be kept in the shade.

Of the roses common in Western Europe the light and dark red varieties of moss, Bourbon, and Remontant roses are richest in essential oil, and might be employed advantageously. Mr. Schmalfuss thinks, so long as the Thracian roses are not obtainable in quantities. Unfortunately, it would appear that, for the present, at least, there is no prospect of a supply of Thracian roses sufficient to admit of a proper experiment. When Mr. Schmalfuss commenced his investigations in Bulgaria, he did not meet with any considerable opposition on the part of the native otto merchants, who, at that time, appear to have been perfectly sceptical regarding the possibility of the remunerative distillation of otto outside their own country. But when Mr. Schmalfuss, encouraged by his success, endeavoured to obtain a first waggon load of plants for export to Germany, the Bulgarian otto trade suddenly raised an outcry and prevailed upon the Government to issue an order strictly prohibiting the export of plants. Efforts will be made to obtain the repeal of this order, and Mr. Schmalfuss' friends are sanguine that at any rate they will ultimately succeed in obtaining a sufficient number of plants, but for the moment their plants, so far as the wholesale import of Thracian roses into Germany is concerned, are frustrated.—*Chemist and Druggist.*

THE PRESERVATION OF FISH IN THE PUNJAB.

TO THE EDITOR.

SIR,—With reference to the letter of Mr. H. S. Dunsford, in your issue of the 20th instant, regarding the preservation of fish in the Punjab, I should, as Honorary Secretary of the North Punjab Fishing Club, like to say a few words. As stated in the above letter, the Punjab Government are averse to forwarding for the information and consideration of Government, the letter written by General H. C. Wilkinson, C. B., late President of this Club recommending that a Fishing Act should be enforced, and submitting certain propositions which he considered necessary to be enforced, in order to check the enormous destruction of small fish; which goes on by every possible variety of methods in almost all the small tributary streams of the Punjab. They, however, referred to a letter received from Government in reply to a letter of Sir Robert Egerton's the late Lieutenant-Governor of the Punjab, submitting a draft Act and rules for the preservation of fish in the Punjab, as long ago as 1880, in which it was stated that, although the Government did not at the time consider such legislation desirable, nevertheless, if at any future period the evil was attaining more serious proportions they would be willing to reconsider Sir Robert Egerton's opinion. The question now arises as to how evidence is to be collected shewing that the evil has greatly increased, and has attained serious proportions referred to since the time when Sir Robert Egerton's draft Act was submitted. This I believe could be done if every one interested in the subject in the Punjab would compile briefly a few notes of the actual destruction of small fish that may have come to their personal notice; giving such information as they might be able to on the various descriptions and methods of destruction employed for the purpose.

If every member of the North Punjab Fishing Club, who is able to, would forward such a statement as is above referred to, a large mass of evidence would be collected and compiled, which doubtless would have great weight; and perhaps would be ultimately the means of the opinion of Sir Robert Egerton being reconsidered.

In this work the hearty co-operation of others, more especially of district officers, is solicited—even although they themselves may not be members of the Club. I would venture to say that in this manner, a formidable mass of the most reliable evidence could be collected. The evil at present is very great and the small fish in the higher beds and small tributary streams get no chance I believe that India is almost the only country in the world where Fishery Laws are not enforced. In China, where the fish-eating population is enormous and a vast consumption of fish takes place, the supply has not failed, and this is entirely due to a wise and careful legislation for the preservation of this important food supply. With reference to Mr. H. S. Dunsford's remark, that he does not consider that the chief depredators on our rivers are vagrants of no fixed residence, I would point out that this remark only referred to the streams in the vicinity of Rawulpindi, where such is actually the case; as can be proved by all land-owners on the adjoining banks. Farther down country, where the inferior Hindoo population is of a different class, and far greater in number than in this part of the country, each village has its regular fishermen, and netters, as Mr. Dunsford states; but this is not the case in the Northern Punjab. In conclusion, I would briefly refer to the very spirited action of the Cashmere authorities, in prohibiting the destruction of fish in the Cashmere and Jummoo territories by the use of dynamite. Also to Rajah Moti Singh of Poonch, who has promised to prohibit the use of small mesh nets in the river Poonch from Tangrot to Kotli, and in certain parts of the river Mahal. Moreover, I hear from the Poonch, that the most stringent orders on the subject have been issued. The thanks of all fishermen are due for this legislation on the Poonch, one of the finest, if not the best fishing rivers in India.

It is to be hoped that this year will see a large increase in the numbers of the North Punjab Fishing Club. Prospectuses and all necessary information about the Club can be obtained on application to the undersigned, by those wishing to join; and fishing diaries, maps of new fishing grounds, and other information will gladly be received and published.

G. H. LACY,
Hon. Secy. North Punjab Fishing Club.

Rawulpindi, 22nd Jan. 1887.—*C. & M. Gazette.*

HISTORY OF THE SORGHUM INDUSTRY OF THE UNITED STATES.

THE following Report, which forms a history of the Sorghum industry of the United States, compiled by Mr. C. Hardinge, has been forwarded to our Foreign Office by our Representative at Washington, Sir L. S. S. West, under date, October 5th 1886:—

REPORT ON THE SORGHUM INDUSTRY OF THE UNITED STATES.

In reply to Mr. Thiselton Dyer's comments on Mr. Drummond's report respecting the extraction of sugar from sorghum and maize, and in explanation of certain statements made therein and questioned by Mr. Thiselton Dyer, Mr. Norman Colman, Commissioner of the Department of Agriculture at Washington, states that Mr. Drummond's information has been gained from limited sources and the facts upon which he has based his conclusions are apparently those derived from the laboratory experiments and opinions of

Dr. Peter Collier, formally Chemist of the Department of Agriculture, and do not take into consideration the result of practical experience in the country, and experiments conducted by the department in the field during the past few years, under the direction of Dr. H. Wiley at present in charge of this subject.

A considerable time has already elapsed since Professor Collier retired from his position as chemist of the Department of Agriculture, the Commissioner having no further need of his services; and Mr. Stewart is not considered to be an authority on whose statements reliance should be placed in connection with the question of the sorghum sugar industry.

With regard to the following statement in Mr. Drummond's report, which Mr. Thiselton Dyer declares to be "quite incomprehensible as a scientific deduction from facts," and to require further elucidation, *viz.*, "It is only after the seed of any variety of sorghum is quite mature, that the maximum of sugar in the stalks is attained, so that there is nothing to prevent the securing of both the maximum of seed and the maximum of sugar from the (same) crop of sorghum"—Mr. Norman Colman asserts that it has been definitely settled, both by experiment and practice, that a full crop of seed is not only incompatible with a larger yield of sugar, but that full maturity is necessary to obtain the largest yield. On the other hand, Mr Norman Colman characterises Mr. Stewart's claims in regard to controlling the vital energies of the growing plant as "certainly extravagant and hardly worthy of consideration"

As to the extent to which this industry has been developed, the extraction of marketable sugar from sorghum and maize has not yet assumed actual commercial importance, the entire production of the past 10 years in the United States not having exceeded, in the opinion of the Statistician of the Department of Agriculture, 5,000,000lbs. (2,232 tons.)

There were in 1884 several factories engaged in the extraction of crystallised sugar from sorghum and maize, and the following is a *resume* of the results obtained by them, as reported to the Commissioner of Agriculture at Washington :—

The sugar factory at Hutchinson, Kansas, one of the best equipped in the country, and in 1883 the services of Professor Swanson, of the Wisconsin University, well-known for his ability in connection with this question, were secured as superintendent. The result of the season's work was 200,000lbs. of sugar, which was heralded in Kansas as the solution of the sorghum sugar question. The facts, however, were that the cost of production was far in excess of the receipts, and the Company became bankrupt. In 1884 another effort was made, with the result of 250,000lbs. of sugar, but again at a heavy loss in cost of production. The report of the Hutchinson Sugar Works for 1884 is as follows :—

1.	Acres of cane worked (100 for syrup only, 700 for syrup and sugar) ...	800
2.	Tons of cane worked ...	6,100
3.	Amount of seed (estimated) ...	10 000 bushels.
4.	Amount of sugar made ...	250,000lbs.
5.	Amount of syrup made ...	50,000 gallons.
6.	Average yield of sugar per ton of cane worked for sugar	47lbs.
7.	Average yield of syrup per ton of cane	7 gallons.
8.	Average yield of sugar per acre ...	357lbs.
9.	Average yield of syrup per acre ...	53 gallons
10.	Value of plant	50,000 dols.
11.	Number of hands employed during season (10 hours per *diem*) ...	22
12.	Wages paid	1 dol. 50 c.
13.	Fuel used (coal) per ton ...	5 dol.
14.	Commenced milling	Aug. 22.
15.	Closed milling	Oct. 30
16.	Cost of raising and delivering cane at factory, per ton	1 dol. 50 c.
17.	Amount of juice expressed ...	40 per cent
18.	Working capital required ...	20,000 dol.

And Professor Swanson, in a letter to the Commissioner of Agriculture, dated the 12th September 1884, makes the following statement :—" Under the present low prices the sorghum sugar industry is barely able to hold its own, but if, under favourable legislation, prices can be advanced from ½ c,

1c. per lb., or if the State or national aid to a like amount can be obtained for a limited time, till the best machinery can be procured, and the methods of manufacture perfected, under these conditions we may safely hope to see the sorghum sugar industry established on a sound basis, and adding very materially to the wealth and prosperity of the country."

The works of the Sterling Sugar Company are at Sterling, Kansas, and in 1883 a new Company was formed, with Professor Scovell as superintendent. In spite of every possible reduction in the cost of production, the season of 1884 resulted in heavy losses for the Company, chiefly due to the extremely low price of sugar; and it was decided not to run the factory again, unless a great improvement showed itself in the market. The following is Professor Scovell's report of the operations of the sugar-work at Sterling :—

1.	Acres of cane manufactured ...	1,000
2.	Tons of cane manufactured ...	7,100
3.	Price paid for cane delivered, per ton	2 dols.
4.	Cost of production of cane, not estimating seed, per ton	1 dol. 57 c.
5	Seed not yet gathered, but will yield 15 to 30 bushels per acre. ...	......
6.	Amount of sugar made	169,000lb.
7.	Amount of syrup made	75,000 gallons.
8.	Value of manufacturing plant ...	80,000 dol.
9.	Number of hands employed ...	50 to 60.
10.	Wages paid, per hour	15 c.
11.	Cost of making sorghum cane into sugar and syrup per ton	1 dol. 10 c.
12.	Amount of juice expressed ...	50 to 60 per cent.
13.	Percentage of feed furnished by bagasse	66⅔ per cent.
14.	Date of commencement of milling ...	September 1st.
15.	Date of close	October 31st.
16.	Working capital required	20,000 dol.

The works of the Franklin Sugar Company at Ottawa, Kansas, which had been thoroughly overhauled, and made into a well equipped sugar factory, under the management of Mr Parkinson, showed the following results for the season of 1884

1.	Acres of cane manufactured ...	600
2	Tons of cane manufactured ...	6,100
3.	Prices paid for cane, per ton ...	2 dols.
4.	Amount of seed	1600 bushels.
5.	Yield of sugar per ton of cane ...	30lbs.
6	Yield of syrup per ton of cane ...	5 gallons.
7.	Value of plant	60,000 dols
8.	Number of hands employed (12 hours per *diem*)	75
9.	Wages of hands, per hour	14 c.
10.	Fuel used (coal) per ton	3 dol 35c
11,	Commenced milling	September 1st.
12.	Closed milling	November 6th.
13.	Amount of juice expressed ...	40 per cent.
14.	Working capital required ...	20,000 dols.

Thus, in the State of Kansas, which, from the nature of the soil and the temperature of the climate, has been shown to be especially adapted for the profitable prosecution of sugar industry, a summary of the operations of the three largest sugar factories gives the following results:—

1.	Number of factories operating for sugar ...	3
2.	Capital invested in plant	190,000 dols.
3.	Working capital	60,000 dols.
4.	Number of hands employed	152
5.	Average daily wages of hands, nearly ...	1 dol. 50 c.
6.	Amount of sugar made	602,000lbs.
7.	Amount of syrup made	1,55,500 gals.
8	Acres of cane worked	2,400
9.	Tons of cane worked	19,300
10.	Value of cane worked	38,600 dols.

The sugars were sold at 5c. to 6½c per lb. wholesale, and the syrups at 15c. to 30c. per gallon wholesale.

The Campaign Sugar Company, whose works are at Champaign, Illinois, made in 1884, 100,000lbs. of sugar; but having sustained very severe losses, and sunk all the money invested, they concluded that they would not attempt to make any more sugar.

Mr. William Fraler, of Esoseas a Vernon county, Wisconsin, being a careful operator, and with only a small centrifugal for sugar-making succeeded in producing 1,000lbs. of sugar during the season of 1884 and made his factory pay a fair profit by making 5,000 gallons of syrup, which were sold to the home market at 40c. per gallon.

Mr. Joseph Porter, of Red Wing, Minnesota, with a model factory for ingenuity of machinery, made 2,500lbs. of sugar and 6,000 gallons of syrup, and, by selling his syrup at 35c. to 50c. per gallon, succeeded in making his mill a paying investment.

Mr. John Stuart, of Traer, Iowa, succeeded in producing from seven acres seven tons of cane per acre from which, by a process of artificial evaporation, he produced 4,900lbs. of sugar,

Messrs. Drummond, of Wanensburg, Missouri, and Messrs Belcher and Swartz, of Edwardsville, Illinois, make now only syrup, having but small hopes that the manufacture of sugar of sorghum be made a profitable business.

The Rio Grande Company, at Rio Grande, New Jersey, exported 385,000lbs. of sugar, but no record has been obtained. This is also said to be a company whose business is a losing one.

Of all the above-mentioned factories, where in 1884 the extraction of sugar from sorghum was carried on, there exist at the present date only two where this industry is being prosecuted—one being that of the Rio Grande Company, and the second that of the Franklin Sugar Company, whose works have been removed from Ottawa to Fort Scott, where experiments are still being made under the superintendence of Dr. Wiley.

The amount of sugar made from sorghum during the season of 1884 may thus be safely based upon the following report:—

Name of Company			Lbs.
Hutchinson Sugar Company,	Kansas	...	250,000
Kansas ,, ,,	Sterling	...	175 000
Franklin ,, ,,	Ottawa	...	183,000
Champaign ,, ,,	Illinois	...	100,000
Mr. Fraser, Evofea, Wisconsin	...	...	1 000
Mr. Porter, Red Wing, Minn,	...	...	2.500
Mr. Ston t, Tracr, Iowa	...	...	4,900
Rio Grande (exported)	...	...	385,000

making, roughly speaking, rather more than 1,000,000lbs. in all.

By comparing this quantity of sugar derived from sorgham, with the annual consumption of cane sugar in the United States, viz 1,170,060 tons (this being the quantity consumed in 1885), the fact is patent to all that this industry has not yet assumed "actual commercial importance and Mr Thiselton Dyer's conclusion "that the production of good crystallisable sugar from sorghum to such an extent and at such prices as to compete successfully with cane sugar remains to be seen, is essentially correct, although in the opinion of the Commissioner of Agriculture great hopes are to be entertained for the future of the industry.

From a study of the foregoing data of the operations in the field during the season of 1884, the only conclusion to be drawn is that the manufacture of sugar from sorghum has not proved hitherto successful. Great results were predicted, but the expectations of the least enthusiastic advocates of sorghum have not been realised, leaving the future of this industry still a matter of doubt. In the opinion of Dr. Wiley this state of things is due to many causes, of which the following are the most evident:—

1. The difficulties inherent in the plant have been constantly undervalued. By taking the mean of several seasons as a basis of computation, it can now be said that the juices of sorghum, as they come from the mill, do not contain over 10 per cent of sucrose while the percentage of other solids in solution is at least four, thus rendering the working of such a juice one of extreme difficulty.

2. The chemistry of the process is at present hardly known, and great development is necessary in this direction.

3. The area of land, where the climate and soil are best adapted for the cultivation of sorghum, is not nearly so extensive as was at first imagined, and investigation should be made in order to discover in which localities the necessary conditions are most favourable.

4. Commercial depression and the consequent low prices have affected this industry, and caused failure and losses in cases where all other conditions were favourable.

5. Lastly, the mechanical treatment of the juice is very imperfect, the machinery used in the mills being quite inefficient for the purposes intended.

With a view to the correction of the last-mentioned defect it was decided by the Commissioner of Agriculture to apply the appropriation made by Congress to conducting experiments for the application of the process, diffusion on a practical scale These experiments, although at first intended to take place in the season of 1884, had, owing to the difficulty of obtaining suitable machinery, to be postponed till the following year.

Dr. Wiley was entrusted with the direction of the experiments, and having obtained the best machinery possible, and erected the battery and necessary buildings in connection with the works of the Frank in Sugar Company at Ottawa, Kansas, the first trial of the process of diffusion was made on the 8th October, 1885. The cutters were at work from 8 A.M. until 5 A.M. of the following day. The weight of the diffused juice from 65 cells, capable of holding 1,400lbs. each, was 96,140lbs. The exhausted chips on analysis showed 0·10 per cent of glucose, while the waste waters of diffusion showed 0·10 per cent. of sucrose and 0 10 per cent. of glucose, thus making the loss of sugar 0.10 per cent. of sucrose, and 0·20 per cent of glucose, or a total loss of 0·30 per cent. This, in Dr. Wiley's opinion, was a very satisfactory result, and makes it appear that diffusion can be successfully practised with sorghum cane, when the weight of the juice obtained is made about the same as that of the cane diffused. The mean specific gravity of the 32 charges, of 700 litres, each drawn from the first series of 32 cells, was 1·0394 at 25° or at 15° 1·0411, corresponding to 10·24 per cent total solids. The average specific gravity of the juice of 32 charges of 600 litres, each drawn from the second series of cells, was 1 0405 at 25° or 1 0424, corresponding to 10 55 per cent total solids. Owing to the great variation in the composition of the cane no estimate of the degree of extraction could be made from the analysis of the cane juices.

The following analyses were made of the diffusion juices during the day:—

Articles.		First time, 10-30 A.M.	Second time, 3 P.M.
Total Solids ...	...	10·84	9 70
Glucose ...	...	2 32	2 00
Sucrose ...	...	6·19	5·90
Solids not sugar	...	2·33	1·80

The weight of coal used during the diffusion amounted to 1½ tons, but half of this quantity might have been saved if the chips could have been promptly removed from the cells, so as to render it possible to make a diffusion every 10 minutes, in which case the whole experiment might have been completed in less than twelve hours

The necessary force required and the expense incurred was:—

	Dol.	c.
One fireman (day) and one (night) at 1 dol. 50c ...	3	00
Four men, on cane carrier (day) and four (night) at 1 dol 25c.	10	00
Four men at battery (day) and four (night) at 1 dol. 25c.	10	00
One team to remove chips (day) and one (night) at 2 dol 50c.	5	00
One valve-man (day) and one (night) at 2 dol. 25c....	4	50
One and a half tons of coal at 3 dol. 25c. ...	4	88
Oil and lights	1	00
One boy (to sweep, &c.)	0	75
Total cost of diffusing 49 tons of cane ...	38	13

With some changes in the construction of the battery, and especially an enlargement of the cells, this rate of expense could be very much reduced, and the cost of diffusing a ton of cane would not exceed 30s. It was estimated that about 15 horse-power was used in driving the machinery and heating the cells.

A careful estimate of the number of tons of the juice which was worked showed that 15 had been carbonated.

This yielded 4320lbs. of "masse cuite," containing 76·9 per cent solid matter, or 11 per cent on weight of cane worked.

The following analysis shows the composition of this "masse cuite":—

			per cent.
Sucrose	...	...	53·48
Glucose	...	...	13 55
Water ...	...	...	23 10
Ash ...	...	...	4·74
Not sugar	...	...	5·13

The "masse cuite" was allowed to stand one week, and yielded 1,420lbs., or about 30 per cent, of washed and dried sugar, or 95lbs. per ton of cane worked,

Allowing 12lbs. per gallon for the "masse cuite," the number of gallons per ton of cane was 24.

The sugar was of fine quality—the molasses of much better quality than that obtained in the usual way—and the whole produce was in every way satisfactory.

Experiments were also made in carbonatation by the process so successfully used with beet juices. The process is simple, and consists in adding to the expressed juice a large excess of lime, and afterwards precipitatig the greater part of it with carbonic acid. The whole is then sent to the filter press, where the precipitated carbonate of lime and impurities are separated from the juice. Owing to a large percentage of glucose in sorghum juice, the process is not conducted in the same manner as with beet juices.

On experimenting with the diffusion juices mentioned above, it was found that about 1½ per cent of lime was sufficient to produce perfect defecation; and in one day about 40,000 lbs. of juice were carbonated, with most satisfactory results. The juice came from the filter press prefectly limped, and of a delicate amber colour. After passing through a sulphur box this juice was sent to the evaporators, and reduced to a "masse cuite" which in colour, purity, and taste was greatly superior to their best product obtained by the usual method.

The carbonatation of sorghum juice, however, demands the greatest care If too little lime is added, the precipitate does not settle readily and filtration is slow and imperfect. The carbonatation must be continued until all but 0·2 per cent of the lime has been removed. If more than this remains the juice will darken and become bitter on boiling. If less than this quantity is left, the impurities appear to be re-dissolved and a green scum forms on the top of the still liquor instead of sinking with the precipitate With the help of proper test re-agents, a little experience will enable the operator to carry the carbonatation to a successful completion.

It was found also that the temperature during carbonatation should not be allowed to exceed 40° C, Directly the carbonatation is completed the juice is raised as rapidly as possible to the boiling-point, and sent at once to the filter-press, If allowed to stand, the liquor will quickly darken. Foaming is prevented by the addition of a little lard to the sugar, and by jets of steam from a perforated pipe near the top of the pan.

In all 100,000 lbs. of juice were carbonated, and Dr. Wiley asserts that this process of defecation offers every evidence of being the one which should be brought into general use. In large sugar factories the saving in scums alone would pay for the carbonatation plant.

The mean co-efficient of purty of the juices worked by the Franklin Sugar Company is 61 3, and Dr. Wiley stated his belief that by proper culture, fertilising, and selection, sorghum cane could be produced in which the juices would have a co-efficient of purity of 75 to 80, the importance of securing such a cane is even greater than that of extracting all the sugar and properly defecating the juice.

The general results of the experiments of 1885 showed that:—

1. By the process of diffusion 98 per cent of the sugar in the cane was extracted, and the yield was fully double that obtained in the ordinary way.

2. The difficulties to be overcome in the application of diffusion are purely mechanical, and by enlarging the diffusion cells to a capacity of 130 cubic feet, and by making a few changes in the apparatus, it would be possible to work 120 tons per diem.

3. The process of carbonatation for the purification of the juice is the only method which will give a limpid juice with a minimum of waste and a maximum of purity.

4. By a proper combination of diffusion and carbonatation, 95 per cent of the sugar in the cane can be placed on the market, either as dry sugar or molasses.

At the termination of the foregoing experiments, Dr. Wiley received instructions from the Commissioner of Agriculture to proceed to Europe for the purpose of inspecting and purchasing such forms of machinery as might appear most useful, also to gain such information as might secure the greatest success in this work; and much useful information, chiefly of a mechanical nature was obtained by Dr. Wiley during the course of his visits to several of the most important sugar factories in France, Germany and Spain.

During the present season of 1886 further experiments are being carried on at Fort Scott under the direction of the Department of Agriculture and it is reported that the results have not proved to be as satisfactory as was anticipated.

The foregoing account has been derived from information supplied by the Department of Agriculture and shows the present phase of the sorghum sugar industry, as requested by Mr. Thisleton Dyer.—*Sugar Cane.*

RINGBONES.

This is a term given to an abnormal growth or deposit of bone upon the pasterns or lower bones, of the legs. There are two pastern bones, called respectively the long and short, or *Os suffraginis* and *Os corona.*

All breeds of horses are liable to ringbones, but heavy draught-horses are more especially liable, as their bones are short as compared with the blood horse and more upright, and concussion is more violent as a consequence. The arrangement or anatomical construction of the horse's foot and leg is such as to minimise the chances of concussion and subsequent inflammation; but it must be remembered we are almost always dealing with animals in an artificial state when we are asked to prescribe for lameness or deformity. Ringbone may occur on the front or hind pasterns; it may be on the upper bone, when it is called "high ringbone," or on the lower, just above the hoof, when it is denominated "low ringbone" and must be distinguished from sidebone, of which we shall treat hereafter. It is often hereditary, and found upon the same horse as splint, spavin, and other exostoses, as growths of bone are technically termed. It should be remembered that the growth of a ringbone is from the *outside.* Bones do not grow from within outwards, but from the periosteum, or covering membrane, and when by concussion this membrane becomes inflamed its function of secreting bone is excited, and calcareous phosphatic matter is produced in excess. Unless ringbones happen to be an hereditary production, the animal having a bony diathesis, or predisposition to throw out deposits of bone, they are caused by a greater strain than the existing bones can endure and the production of more bone is within certain limits a physiological process destined to prevent the recurrence of the strain by providing against a like contingency. The process of inflammation and the products of inflammation are viewed in a totally different manner than formerly. Inflammation of any structure is in reality an effort of nature to accommodate the parts to altered circumstances. This may best be illustrated by reference to the human hand. The soft palm will blister with an hour's rowing the blister is the result of inflammation. The sequel is a corn, and the rower's altered condition will soon enable him to use the oars without blistering. If he leaves off rowing, and the corns are no longer required, nature will absorb them or cast them off. If this is borne in mind in the treatment of horses, good results will follow. All ringbones do not require the same treatment. We will suppose a client has a young cart-horse which has fallen lame with incipient ringbone. This is the time to use a sedative or evaporating lotion, in order to modify the extent of the inflammation, and not produce a lot of bone, which will be an eyesore and a detriment to the sale of the horse. In such a case an excellent lotion may be made as follows:—

Acid acetic	...	...	...	... oz. j.
Tinct. arnicæ	...	...	...	... oz. j.
Liq. plumbi acet	...	...	...	... oz j.
Spt. vini	...	...	...	... oz j. vol. oz. j.
Aq. dest. ad	...	...	...	... Oj.

M. ft. lotio.

To be applied on a wet swab or bandage, renewing it frequently. In a young horse this will probably so reduce the irritation in the course of a few days that he will go sound again; but the cause must be removed, and the colt turned out to grass till his bones become more consolidated and fit to bear the concussion and strain of starting heavy loads on macadamised roads. If the owner cannot or will not be persuaded to turn the colt out, or, as it often happens, has not the capital to invest in another, then blistering must be resorted to. Blistering will probably *not* remove the ringbone, as we recently informed a correspondent, but it will absorb some of the deposited material, and by thickening the skin and supjacent structures, give increased support to the parts, as does the corn upon the rower's hand. It often happens that with a steady driver or considerate carter, a ringbone will entirely disappear, the horse never being again subjected to so severe a strain as that which caused it and its absorption being undertaken by Nature because found to be unnecessary.

This does not apply to hereditary ringbones; the absorption is out seldom accomplished with or without treatment. A great many cart-horses have ringbones with experiencing any particular inconvenience, and they are best let alone unless there is lameness or a palpable increase in their size, when blistering should be resorted to. Our readers are all acquainted with good recipes for blisters; but there are blisters and blisters, and before deciding what to use, the question should be asked at what age and under what circumstances has the subject developed ringbone. If it is a recent case, a cantharides blister will do well enough. If of long standing, then—

Hydrarg. biniodid	...	...	oz. j.
Adipis ad	...	...	oz j.

M. ft. ung

Three or four ounces will be required for a cart-horse's leg even when clipped tolerably close. All veterinary preparations should have an allowance for waste; if it be an ointment some will run down and fell oft, and if it be a drench some will be spilt, "Half in and half out, like a farrier's drench," is quite a stable proverb. A practical prescriber will not fail to tell his client to tie the horse's head up for at least two nights and days, lest the patient should gnaw the parts, damage the skin irreparably, and blister his own nose, a most unsightly accident, which causes many a horse-owner to pay half a guinea for having a horse blistered when he might have got the materials for a new shilling and done it himself. A basket suspended from the ceiling can be used for the food, if the horse shows a disposition to strike the manger with a front leg that has been blistered. Whenever a blister is prescribed for any of the lower parts of the legs the owner should be cautioned to remove the straw, as much unnecessary pain and sleeplessness is produced by the ends tickling and irritating the blistered surface.

On the third day after blistering a simple ointment should be used to soften the skin and prevent cracks and ulceration; this is very grateful to the patient and will usually prevent him from gnawing it when his liberty is restored to him and the opportunity given to lie down. Blisters indifferently applied cause pain without benefiting the animal, and humanity demands that we shall take every care that it is done properly, not in a perfunctary manner, requiring repetition, or, as with acid sulph., causing sloughing of the skin and permanent blemish. Careful veterinary surgeons, after seeing that the limb to be blistered has been properly clipped, begin the operation by putting a little ung. simplex into the heel, as that is the part most likely to crack and cause lasting trouble.

Large surfaces should not be blistered with cantharides, as absorption and kidney disease have been known to occur.

The following is an effectual blister and in much request by farriers:—

Pulv. canthar	...	...	1 ounce.
,, resinæ	...	...	1 ounce.
Adipis	...	...	4 ounces.

The lard and resin to be melted together, the cantharides added and stirred till cold.

Preparations of Hyd. bichlor, and blisters containing Ol. terebenth or Tereb. Venet. should be avoided: they are extremely painful, liable to produce sloughing, and not *lasting* in their effects, whereas the benefit of a biniodide blister is often observable for months after application.

If a horse is gross and disposed to have swelled legs, he should be kept on bran mashes for twenty-four hours, and get a physic ball of from 4 to 6 drachms, according to his size. Service blistering and the severer operation upon a horse in a plethoric and unprepared state have been known to produce lock-jaw and death.—*Chemist and Druggist.*

SUGAR BOUNTIES.

The chief continental states of Europe have long been filled with a strong desire to promote at almost any cost the well-being of their sugar refiners. The first Government to be bitten with the mania was that of France, which, in the organization of its finance after the war of 1870, so arranged the import duty on sugar and the drawback granted on its export as to produce a heavy bounty

on the latter proceeding. The Governments of England, Belgium, and Holland, stimulated no doubt by those of their tax-payers who were interested in sugar, remonstrated without avail against the action of the French Government. Some years later the French appeared to be convinced of the reason of the arguments which had been addressed to them, and greatly reduced the export bounty. By that time, however, it was found that all the loaf sugar refineries in England had been closed, a fact which perhaps, had something to do with the generous policy instituted across the Channel Holland which had been loud in its protests against France, now, however, went over to the same view, and established a sugar bounty. The contagion spread, Germany subsidised her sugar manufacturers so heavily that the tables were completely turned upon France Then, Austria entered the lists, but found her generosity so heavy a drain on the Exchequer that the bounty was greatly reduced. Lastly, in 1885, the Russian Government began to grant a bounty of £6 5s. on every ton of sugar exported. Here, again, however, the national finances have proved unequal to the strain, and, to the discomfiture of the Russian sugar manufacturer his Government has announced that the bounty will shortly be withdrawn. More irregular than the proceedings of these European countries has been that of the United States, which in direct violation of one of the fundamental laws of the Union, directed against bounties on export of any kind, granted in 1883 a bounty of 1s. 9½d. per cwt. on exported sugar. The result is that American sugar can be purchased at a cheaper rate in England than even in the United States. The latest phase in war of bounties is the increase of the French bounty to nearly £8 per ton. The loss to the French treasury from this proceeding is estimated to amount during the current year to nearly three and a-half millions sterling, but the French sugar dealer will have the satisfaction, it is said, of completely commanding the English market. From the point of view of the English sugar manufacturer this, of course, is unpleasant, but the nation which consumes and does no manufacture the article can surely have no objection to the French Government taxing itself to provide them with cheap sugar.—*Englishman.*

FODDER AND FEEDING.

By Dr. A. P. Aitken.

The practical results which have been attained in this country in the feeding and fattening of stock are such as to excite universal admiration, and that admiration is increased when we consider that these results have been attained by men who for the most part had no scientific training, but who brought to bear upon their industry those natural qualities of careful observation, indomitable perseverance, and general sagacity and shrewdness, which have for many years characterised the farmers of this country. In view of such splendid results arrived at by the exercise of natural talent, many may be disposed to consider that practical experience and daily familiarity and sympathy with the life and progress of farm stock, are sufficient to enable men of ordinary intelligence and education to achieve the highest measure of success without any aid from what is commonly called science. If by science is meant a certain amount of book-read knowledge of facts and principles concerning animal nutrition and breeding without the practical experience and insight required for their application the opinion is well founded; but farming is a practical industry, and it is only when science is engrafted upon practice that it becomes of any practical use. There can be no doubt that if those who have succeeded so well with practice alone had had the benefit of scientific training, they would have attained the same measure of progress more rapidly and economically. The hope is that in working out the scientific problems involved in the practice of stock feeding we shall discover the true *reason why* for every successful method in use. When that is known there will be no danger of our being led astray into methods that are erroneous but on the country, we shall have clearly pointed out to us what are the directions in which to go in order to achieve sure and rapid progress.

With this object in view, an enormous number of experiments have been performed and are still being performed in numerous agricultural schools and stations in Europe and America, and the laws of animal nutrition are gradually becoming known.

The importance of grape sugar as a means of producing, by its combustion in the blood, animal heat and activity, and the part which albuminoids fat, and carbohydrates of various kinds take in supplying that substance, have been referred to. We shall now consider the albuminoids more particularly.

The flesh of animals consists principally of aluminoid matter along with a varying amount of fat dependent on the fatness of the animal. This albumen is formed or built up into tissues which have definite forms easily recognisable under the microscope; but besides these organised muscular and other tissues, there is in the body, soaking through it and bathing all its parts, a large amount of albumen of an unorganised kind, which is circulating in the blood, and lymphatic system and there is also the corpuscles of the blood, which though an organised tissue are not highly organised, and are continually changing and breaking down. Organised albuminoid tissue is formed slowly, but the unorganised or circulating albumen is poured daily into the blood in a copious stream from the albuminoid matter of the food eaten. It is this albuminoid matter which supplies the daily albuminoid or nitrogenous waste already referred to, and it is the object of the feeder to secure that the amount of albuminoid matter contained in the food shall be sufficient not only to compensate that waste but also to provide material for building up the muscle and other albuminoid tissues of the body. Moreover, the muscle of the body is also being gradually, though in ordinary circumstances very slowly, wasted, and that waste has to be made good. It has been found that from 70 to 80 per cent of the circulating albumen of the body is decomposed in twenty-four hours, while not so much as one per cent of the organised albumen suffers decomposition. The amount of albuminoid waste is measured by estimating the amount of urea or other nitrogenous compound voided daily in the urine, so that if we analyse the food and know how much albuminoid matter it contains, and if we subtract from that the albumen corresponding to the amount of nitrogen contained in the urine, we can tell whether the animal is gaining or losing flesh. If the urine contains less nitrogen than corresponds to the albuminoid matter contained in the food it must have been retained as albumen in some form or other in the body. The amount of nitrogen or albuminoid waste depends on the amount of food an animal eats, and the bodily condition it is in. The waste is least when the animal is getting no food at all, that is to say, when the animal is consuming its own body, and in such circumstances all animals may be regarded as flesh-eaters, but it is found that the amount of flesh consumption going on in hungering animals per 1,000lbs. live weight differs with the kind of animal. In the case of a man it is about 14 grains, in a dog it is about 18 grains, whereas in an ox, which is a herbivorous animal, it is only about 7 grains per day.

Knowing the extent of the albuminoid waste that goes on in a hungering animal, it might be supposed that if albuminoid food were given to it in sufficient quantity to cover that waste, the animal would be maintained in a fair state of nourishment; but in reality it requires more than that quantity for the albuminoid waste increases with the increase of aluminoid food. The waste of a hungering animal is due to the breaking down of organised albumen and the albumen of the food must be increased to more than double the amount of that waste before the wasted tissue is able to be replaced. When the amount is increased above that limit—the waste is more than compensated and the animal puts on flesh very gradually until it arrives at a certain condition in which the amount of albuminoid waste is exactly compensated by the amount of albuminoid food. In order to cause a further increase of flesh, an increased amount of albuminoid food is necessary, and if this is continued for some time the animal improves in condition up to the point at which once more an equilibrium is established between the albumen in the food and the albuminoid waste as determined by an analysis of the urine. Thus the higher the state of *condition* on which an animal is, it requires a correspondingly large addition of albuminoid matter in its food, in order that it may maintain or improve its condition. Owing to the great increase of albuminoid waste that attends every increase of albumen in the food, animals can only put on flesh slowly and at an ever-increasing cost of albuminoid food. If food is withheld, even for a very short time from an animal in good condition, or if from sickness or otherwise it refuses its food, it loses condition far more rapidly than it is able to regain it by subsequent feeding. It is therefore, of the utmost importance that the feeding and management of stock should be conducted in such a manner as to enable them to improve gradually by gradually increasing the albuminoid constituents of their diet for if through carelessness orr otherwise any check takes place in their progess, it may take weeks to repair the mishief of a day.

There are some things which increase the amount of albuminoid waste, such as giving the animals too much water to drink or feeding them on a watery diet, which increases the amount of urine voided. Anything which produces thirst, such as too much salt in the fodder, too high a temperature in the stalls, or too much exercise causing a loss of water by perspiration increases the albuminoid waste. Milch cows which are parting with a large amount of water in the milk they secrete, require a more waterly diet, and are improved in their milk-giving by the addition of some salt to their fodder; but both water and salt must be given within judicious limits, or the cows will not only lose flesh, but the milk they give will diminish in quality, if not in quantity. Salt added to fodder increases the activity of the absorptive functions, and renders the animals eating it more active in their temperament, so that it is a useful adjunct to the food of horses from whom activity is required. It is also useful in the rearing of young stock and specially of young bulls, to induce them to indulge in the amount of exercise requisite for their health.

Sheep, on the other hand, which take little water, require less salt, and oxen that are fattening should get only as much as is necessary to make their food more appetising, so that they may eat the more of it.

In order to stimulate appetite in fattening stock, various condiments are frequently added. If these substances are effective in increasing the amount of food consumed, and if they can be bought a something less than a ruinous price, which is seldom the case, they may be found a useful adjunct to fodder. They do not themselves exert any influence on the amount of flesh which an animal may gain or lose, they are simply useful in making fodder more platable and attractive.—*North British Agriculturist.*

THE

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 2ND FEBRUARY 1887].

Madras—General prospects good.

Bombay.—Reaping of late *kharif* and early *rabi* crops going on in several districts. Standing crops injured by blight in some parts of the Deccan and Southern Maharatta country, and by frost and insects in parts of Hyderabad, Karachee, and the Panch Mahals. Fever and cattle disease in parts of eleven, and small-pox in parts of five districts.

Bengal.—Weather cold. Showers fell in the eastern and central districts. *Amun* harvest has been got in with good outturn. *Rabi* crops are very favourably reported on. Poppy is generally expected to be a fair crop, but weather is unfavourable in Sarun and Shahabad. Sugarcane is being pressed, and mustard and other early *rabi* crops are being gathered. Recent rain has facilitated ploughing for early crops, which has begun. Public health is generally good, but fever is prevalent in Backergunge and cholera in Tipperah,

Punjab.—Slight rain in the Delhi, Ferozepore, Amritsur, Dera Ismail Khan, and Peshawur districts. Health good. Prices stationary in the Jullunder, Lahore, Mooltan, and Dera Ismail Khan districts, elsewhere rising. Crop prospects good, but more rain is wanted,

Central Provinces.—Weather clear and cold, except in Bilaspur. Prospects of *rabi* crops generally favorable Threshing of *kharif* continues in Chattisgarh. fever and cattle-disease in places. Prices steady.

N. W. P. and Oudh.—Weather clear and cold. *Rabi* crops flourishing and prospects good everywhere. Markets well-supplied, but prices show an upward tendency. Public health good. Slight cattle-disease in a few places.

Burmah.—A few cases of cholera in four districts of Lower Burmah, and slight cattle-disease in one Harvest all but over. Reports received from eight Upper Burmah districts and but for a little cholera in Pagan, the public health is good. Food-supplies sufficient and prices normal. Crops being got in, Slight rain has fallen in most districts.

Assam.—Weather cloudy and rainy. Gathering of mustard nearly finished. Crushing of sugarcane commenced. Mustard and linseed partly damaged by insects in Habiganj and South Sylhet sub-division, otherwise state and prospects of the crops good. Reaping of *kalai* finished. Ploughing for *ahu* progressing. Cholera still lingering in Dhakuakhana, otherwise public health good. Prices steady.

Mysore and Coorg.—Standing crops in good condition, except in parts of the Tumkur district where blight prevails. Prospects of season continue favorable. Public health good. No material change in prices.

Berar and Hyderabad.—Weather clear and cool. *Rabi* crops in good condition. *Kharif* threshing completed. Wheat and linseed crops becoming blighted. Fever and ague prevalent in almost all taluks. Prices steady.

Central India States—Weather cold and windy. Health and prospects good. Opium and other crops flourishing. Health good, Prices rising.

Rajpootana.—Weather seasonable, tanks and wells decreasing. Prospects generally good, except in Jeypore where the crops are below the average. Public health good, except in Bikanir, where fever is prevalent. Prices show an upward tendency.

Nepal,—Weather cold and frosty, Prospects fair, Prices high.

Editorial Notes.

The report on the prospects of the mustard crop in the Assam Valley districts states that the area under mustard this year is 148,443 acres, as against 151 850 acres last year. The crop this year is estimated at 12 annas against 14 annas last year. The exports in 1887-88, will be about 20,000 tons

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THE exports of wheat from India to foreign countries during the nine months from April to December 1886 amounted to 19,920,423 cwts., valued at Rs. [illegible],65,058. This shows an increase of nearly 1¾ million cwts., and nearly a crore in value, over the figures for the same period last year. But as compared with the figures for 1885, the actual exports during December last show a considerable falling off. The countries to which the grain was chiefly exported are the United Kingdom, France, Egypt, Italy and Belgium Next to the United Kingdom, the largest consumers of Indian wheat are Italy and France, the first named having taken over 4½ million cwts. during the nine months under review. This is accounted for from the fact that our Indian wheats are peculiarly well adapted for the manufacture of maccaroni.

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WE learn from a reliable source that the Government of the North-Western Provinces intend to stop the publication and issue of the usual reports upon the experimental operations carried out annually at the Cawnpore Experimental Station. It need scarcely be said that if such is the intention, the Government had better abolish the station, as it will serve no good purpose to conduct experiments there and not publish the results for the information of the public. We have an idea that were this intention carried into effect, a very strong public protest would be made against the maintenance of an institution at the public expense, without having some sort of account of that expenditure, in the shape of the annual report, and the results of the experiments carried out there for the benefit of the public. We hope, however, that our correspondent is misinformed.

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WRITING on the subject of rice mills, *Indian Engineering* say :—"The almost total absence of rice mills in such rice-producing countries as Bengal and other deltaic areas of India is as often a matter of surprise as regret to many. Our friends in Burmah are disposed to be amused at the advertisement in this and other journals over the signature of a well known Bombay firm offering a rice mill at Port Canning for sale or lease. This mill is described as *the largest in Asia*, being capable of turning out 1,000 bags of cargo, or 800 bags of white rice *daily*. *But we are informed that there are probably* in Burmah at the present moment, at least twenty rice mills of greater capacity. In Rangoon there are two, which could easily turn out treble the number of bags in the 24 hours."

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WRITING on the diseases of fish, a correspondent of one of our American exchanges, states it as quite a singular fact that, when an epidemic breaks out in any waters, only one kind of fish is affected at the same time, which shows that it cannot be caused by any impurity of the waters or any cause of a similar nature, or else all the different kinds of fish in that body of water must be affected in a similar manner. As is the case with the human race,certain fish escape the contagion,and it is a pretty safe rule that where they can be taken by angling with hook and

line, those fish are safe to eat. When fish are affected by disease they almost invariably die, not one in a hundred recovers, and there is at present no known remedy which can be said to be efficacious. The only remedy which we have ever known to have any effect is a common salt and water bath, we have used it with good results in a few instances with trout. The brine should be made strong enough to float a potato. The sick fish is then placed in it and allowed to remain until it turns over, which will usually occur in a few minutes. It should then be taken out immediately and placed in fresh water. The fish should be immersed in this bath about twice a day, and the operation repeated about half a dozen times. If this does not cure the fish, you may give it up as a hopeless case.

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THE people of Tinnevelly have been airing a grievance in the Madras papers, regarding certain restrictions said to have been placed upon the pasturage of cattle in that district by the forest regulations. Colonel Walker, Conservator of Forests, has taken upon himself to show that there is no ground for the charges brought against the Forest Department in this matter. That instead of any fresh restrictions having been placed on cattle-grazing in the Tinnevelly forests since the passing of the Forest Act, much greater liberty has been allowed free of charge, the only condition imposed being that no fires should be lighted. But within three months from the date of the concession the forest had suffered from fires to the extent of many thousands of rupees. Still the concession has not been withdrawn, as the Madras Government is most anxious to do all it can to promote the welfare of the ryots in the neighbourhood of forests.

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THE report on the irrigation works in the Punjab for 1885-86 cannot but be regarded as a very satisfactory feature of the administration of that province; we thus gather that the capital outlay, exclusive of Rs. 1,18,67,230 contributed by Native States for the construction of the Sirhind Canal, amounted at the close of the year under review, to Rs. 5,52,99,891, of which Rs. 22,70,868 were spent during the year. Of the total outlay Rs 5,28,69,702 represent the capital of canals in operation including of all those for which revenue accounts have been opened. The gross revenue assessed on canals, for which capital accounts are kept, amounted to Rs. 40,17,946, and the working expenses to Rs. 20,19,199; the net assessed revenue was therefore Rs. 19,98,747, giving a return of 3·61 per cent on the total capital outlay, and 3·78 per cent on that of canals in operation. Up to the close of the year the net revenue had exceeded the interest charges by Rs. 2,00,43,257. The Government Resolution reviewing the report, says:—"This being the last report which will be submitted by Colonel R. Home, the Hon'ble the Lieutenant-Governor takes this opportunity of expressing his sense of the care and ability with which this department has been administered by that officer, and of the benefits which have resulted from the numerous works of irrigation which have been initiated and carried out by Colonel Home during his long connection with the canals of this province."

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Is the eye of a farm animal indicative of character? The *American Agriculturist* say it is; for we are told that the eye in farm animals, as well as the human being indicates character. The placid eye of the Jersey cow shows that she has a kind disposition; the subdued fire or flash of the eye of the trotter indicates its spirit. A large, prominent eye denotes intelligence and usually courage. The horse with such an eye will be an agreeable driver, and is rarely a shyer or a runaway. In cattle we desire a quiet, docile disposition, that the beef animal may not lose flesh by violent exertion, that the bull may not be dangerous, and that the cow may be tractable. Hence, in selecting cattle for any purpose, we should look for an eye with a calm, placid, deep expression. The cow that will nose you when you are milking her has such an eye; so has the steer that will follow gently after you when you have the feed basket on your arm. This is not to be confounded with the dull, lifeless, eye, which indicates stupidity and slowness objectionable in all animals, especially in horses and work cattle. The desirable eye is always bright and full, and full of expression. A small eye usually indicates stubborness. The eye of the hog shows its peculiar disposition. But the eye may be too lively. A restless eye is evidence of a highly organized, nervous temperament and fire in it often shows a vicious disposition. Hence it is to be avoided in cattle and farm horses.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 2nd February 1887:—Except in Bengal, Assam, the North-Western Provinces and Oudh, Punjab, and Upper Burmah, where slight showers have occurred in a few districts, the week under report has been rainless. The reaping of the early *rabi* crops has commenced in Bombay and Bengal, and except in the Punjab, where more rain is still wanted, the standing *rabi* crops throughout the country are generally in excellent condition and promise a good harvest. In Madras the general prospects are good, but in several districts water is wanted. In Bombay standing crops have in some places been injured by blight, frost, and insects. In Bengal the *amun* rice has been gathered with a good outturn, and in the districts of both Upper and Lower Burmah, the harvest is rapidly approaching completion. Poppy continues to thrive in the North-West Provinces and Oudh and a fair crop is expected, though in two districts the weather is unfavourable. In Bengal, the North-Western Provinces and Oudh and Assam, the crushing of sugarcane is in progress, and in the last named province the mustard crop is being got in. The public health continues generally satisfactory throughout the country. Prices show an upward tendency in the North-Western Provinces and Oudh, and are rising in most districts of the Punjab and in three States in the Rajputana Agency. In Coorg they are falling, but are generally stationary elsewhere.

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THIS is the season for horse, cattle and agricultural shows. A horse fair (it could scarcely be called a competitive show) was held at Shikarpore, in Sind, on the 28th ultimo. It would appear that these gatherings are regarded more as occasions for the display of everything but what they are intended for. This is a feature which ought to be kept within reasonable limits. Thus, a correspondent, who professes to describe the horse fair, writes about everything else except the horses! The only practical reference to the fair itself is contained in the following paragraph:—"It was a great pity that the Agricultural Department was not properly represented; the English and American steam threshing machine had not arrived, and the intention of the President to show the people the superiority of mechanical over hand labour was thus frustrated. However, when the machines do come, it will be a great benefit to the cultivators of the province to see them work, and there is no doubt that some of the enterprising Shikarporees who own land about will avail themselves of the opportunity of seeing what implements are suitable, and may purchase those driven by bullock power. Those driven by steam are too expensive and too wholesale in their operations for a province like Sind, where the land is as yet cultivated in the most primitive manner." It may therefore be fairly inferred that if the Agricultural Department was not properly represented, the objects of the fair could not have been realised to any extent. This is much to be regretted. In our notice of the recent Dumraon Agricultural Exhibition, we have dwelt upon this point at some length.

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THE *American Agriculturist* has some pertinent remarks on the hair of animals in health and disease. The hairy covering of our farm animals not only protects from cold, heat and rain, but makes the appearance of the animal more agreeable. We often say that an animal is of an ugly colour, and yet it is more agreeable looking than it would be without hair. As an indication of the qualities of the animal, the hair is made of value to the breeder or feeder. Fine silky hair, especially if it has a tendency to curl, is an indication that the animal will fatten easily and that its flesh will be fine-grained and of good quality. Coarse stiff hair, is invariably found on an animal slow to fatten and of coarse flesh. This applies to cattle, hogs or sheep, and irrespective of breed. The shrewd feeder, and also the shrewd breeder, will reject an animal with very coarse hair. Such hair usually accompanies a bad disposition. A

coarse-haired cow generally gives poor milk ; a fine haired cow gives rich milk. But usually coarse-haired sows are more prolific while fine-haired sows are the better sucklers. Staring hair indicates an unhealthy condition of the body ; but when cattle lick the hair—in the wrong direction—they are thrifty. By studying the peculiarities of the hair of our live stock, much of the internal structure and of the disposition of the animals may be learned.

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The forecast dealing with the sowings of the late crops, which include paddy, *cholum*, *ragi*, cotton, castor and lamp oil, and *gingelly* oil-seeds, in the Madras Presidency, states that the area sown cannot be compared with that of the corresponding period of the preceding year, as the cultivation statements of the latter do not show the acreage of early and late crops separately. The following statement shows the percentage of the area under late crops to the total cultivation up to November 1886 :—

Name of Crops.	Total Area of Cultivation up to November		Acreage of late crops in 1886.	Percentage.
	1885.	1886.		
1	2	3	4	5
	Acres.	Acres.		
Paddy ...	4,467,995	4,959 156	2 616 202	52 7
Cholum ...	3 384 200	3,119 016	1,407 098	45 1
Ragi ...	1,243,406	1 178 575	523 308	44 4
Cotton ...	1,157 699	1,270,196	1,020,059	80 3
Gingelly oil-seeds ...	424,713	506,142	86 305	17 1
Castor and Lamp oil-seeds ...	544,080	642,152	241,379	37 6

The extent cultivated with paddy, *cholum*, and *ragi* is nearly equally distributed between the two seasons. The oil-seeds are sown in the early part of the year, while cotton is planted in the latter part of the year. In the case of *cholum* and *ragi* the area under cultivation during 1886 was below that of last year by 9 and 6 per cent, respectively. In the case of the other crops, it exceeded that of last year—paddy 10 per cent, cotton 9 per cent, castor and lamp oil seeds 15 per cent, and *gingelly* oil-seeds 16 per cent.

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A comprehensive test of the various breeds of cattle to be found in the U.S.A., is about, we see, to be undertaken, which is likely to lead to most important results, The *Breeders' Gazette* announces that Professor J. W. Sanborn offers the services of the Missouri State Agricultural College Farm to the breeders and stockmen of the country for the purpose of carrying on an extensive trial of the breeds to aid in settling most important questions of interest to stockmen and farmers. He states that food has so profound an influence on animal growth that slaughter rings at fat stock shows as now conducted, are valueless for the purpose for which they are used. Food has made with him 40 percent difference in the fat of hogs and has varied its colour and consistency. Food influence on marbling and development of fat of cattle may be more pronounced than breed. Thus American cattle from different breeders hands may show more the influence of food than of breed, and may lead to false conclusions. Professor Sanborn has asked the National Associations for each breed to donate ten calves to the Missouri State Farm at weaning, to be selected by experts appointed by each association, from the best representatives of each beef breed.

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The following purposes are to be served : 1. These cattle will be the best and official representatives of their breed, and thus not challengeable. 2. All food will be weighed that is eaten and thus on fifty head of such steers the food required for a steer's growth can for the first time be fairly ascertained 3. The increased cost of growth as an animal advances in age or weight can be accurately known and calculated upon. 4. The varying growths of the breeds at varying ages can be found. 5. The food required to make a pound of growth on each breed will be found or the amount required to mature each breed. 6. By dividing the ten into three lots the influence of varying foods on marbling and fat in general can be found. 7. The economy of food rations can be well tested. 8. When fed upon the same food a fair test of the relation of breed to marbling or to quality of meat will be obtained. 9. These and other points to be tested will be done without prejudice at a public station and for the whole country. 10. The weights of the various vital and other organs and parts will be taken. 11. A study of the meat, fat, &c., will be made under the miscroscope and in the chemical laboratory, as well as by butchers. In short the trial is to be full, both practically and scientifically, foods being analyzed, and no pains and expense being spared to make the trial exhaustive. We are told that all the associations asked to aid this work have most generously and broadly placed a committee and ten cattle at the disposal for this work of the State farm in question. Assurances are given that every one of the beef breeds will be represented.

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Messrs. Arthur Guinness, Son & Co., in their review of mining industries, write as follows on the gold fields of India :—" There are now twelve distinct companies working for gold in India, and it is satisfactory to know they are all obtaining it, some it is true in small quantities to begin with, but in every instance the deeper the sinking, the better the result. This great goldfield being now an established fact, it is only a question of machinery, good management and sufficient capital to continue the sinking. The mines have been proved beyond doubt, and that is a very great deal, A proved mine is worth money, and is only a question of time when its value will increase. It is wonderful the interest that the public are beginning to take in Indian gold mines There may be a lull for a time, but the interest awakens again. The fact is that the increase which has taken place in the number of shareholders in Indian gold mines now, compared with 1881, when they were first introduced, is enormous, and the more the area of believers is widened out the better it is for active dealing Those who come in early benefit by the buying of those whose faith dawns upon them at a later period, and from all the signs of the market at present there would seem to be little doubt that between now and the spring we shall have very active markets, for all the best Indian gold mines and of course the more their value is proved, like everything else, the higher prices investors will have to pay for shares in them "

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The value of wheat bran as a food for stock is not sufficiently known in this country. Its value is fully known and appreciated in America, as will appear from the following extract from the *American Agriculturist* :—" Feeding corn meal and hay will keep calves and colt fat ; but the animal will not grow rapidly unless fed with oats, wheat-bran or oil-cake in addition. By many, wheat-bran is preferred to oil cake for young animals, because it is not so concentrated, and does not tax the digestive organs so severely. Calves grow very rapidly when fed on corn-meal, oats, wheat-bran and clover hay, because such feed furnishes them what muscle-forming matter they need. If wheat-bran is kept in the slop-barrel the pigs will grow faster A good slop for pigs is made by pouring hot water over wheat-bran and feeding it while yet warm. Sir John B. Lawes states that the manure made by sheep from bran is worth more than the bran originally costs. Mature sheep do unusually well when fed with bran, and young sheep make a yet greater gain from it *Young animals can masticate bran before they can grain or hay* : and at this early period of life it furnishes them carbohydrates and albuminoids in the proportion needed. Bran is as cheap a stock food as most farmers can use. There are several distinct grades of bran offered in the market, varying considerably in quality and price. The coarsest known as common-bran, weighs twenty pounds per bushel, " ship-stuff " weighs thirty pounds, " middlings " weigh forty pounds and the finest called " sharps," fifty pounds. Under mill-feed is understood all the various grades of bran of country mills mixed together.

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The winter session of the Royal Agricultural College, Cirencester, terminated on the 20th December last when, we are told, the Principal, the Rev. J. B. M'Clellan, distributed the diplomas, &c., in the college hall. The Principal, in the course of his observations, congratulated the college on the admirable

year's work just concluded, and referred to the additional advantages in practical agriculture which the college had this year placed at the command of its students, as shown by the fact that the competitions in practical work now included cultivation work, farm journal, practical work on the farm, shepherding, care of fatting cattle, care of pigs, ploughing competition, milking competition, butter-making competition, college farm valuation, report on the work of the farm, essay on capital required to stock a 500-acre farm, practical work at the veterinary hospital and hospital journal, *post-mortem* examinations, care of patients, management of Turkish baths, lathe work, forge and smith work, carpentry and wheelwright work, and saddlery and harness work. One of the most satisfactory features of the past session, and one which will doubtless interest many in India, is the fact that among the recent honours gained by students of the college, it was mentioned that the first place at the Royal Agricultural Society of Ireland's examination for diploma, &c, open to all comers, had been gained by Mr. N. U Banerjea, an Indian student of the college, who was awarded the special diploma of the Society and silver medal. Referring to the examination for the college diploma, the Principal said the external examiners had been —(*a*) In the practical agriculture. Mr. Arthur Gibson, Bulwell, Notts, and Mr. J. T. F. Jackson, Tattenhall, Cheshire; and (*b*) in agricultural chemistry, Dr. J. A. Voelcker. The reports of these gentlemen, and by the eight professors of the callege, were highly satisfactory.

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THE final report on the prospects of the Cotton crop in the Punjab for 1886 is as follows :—

This is the first year in which an attempt has been made to estimate the area and yield under cotton in the Punjab according to the plan laid down by the Government of India. Exact comparisons therefore with acreage and yield of former years are impossible. The year has been generally favourable for cotton. The area under cotton in the last three years was as follows :—

Year.		Irrigated. Acres.	Unirrigated. Acres	TOTAL. Acres.
1884	...	455 114	337,882	792,996
1885	...	521,230	514,384	1 035 614
1886	...	489 300	600,000	1,089,300

Thus the acreage of 1886 has been higher than in the two previous years, the increase being most marked in unirrigated land

An attempt has been made to estimate the outturn after ascertaining the average yield in each district. The estimate is of course only approximate. It shows the total yield of the province to be 4,671,183 maunds of unginned cotton. Taking ginned cotton as a fourth of unginned, the outturn is 1,167,797 maunds (or 834,140 cwt.) of pure cotton.

The districts growing the largest area of cotton are Rohtak, Gurgaon, Umballa, Multan, Lahore, Sialkot, Gujrat, Shahpore, Jhelum, Rawul Pindee, and Dehra Ghazi Khan.

"The accompanying statement* gives details for each district. The last column giving average produce per acre in each district shows considerable differences. It is probable that the yield has not been correctly estimated in every district. It must be remembered, however, that these averages do not represent the outturn of an average year, but such an outturn corrected to show the yield of the year 1886, and this necessarily varies according to the season.

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'OBSERVER' writes to the *Statesman* as follows on the subject of sugar :—

If I remember correctly, it was stated in one of your recent issues that the imports of Mauritius sugar into India are decreasing, and that this is due to an improvement in the sugar industry in India. The trade returns published by the Financial Department seem to disprove this statement, as on turning to them I find that during the nine months ending 31st December 1886, the total imports of refined sugars were in round numbers 1,275,000 cwt., of which 1 020,000 cwt. were received from Mauritius, against 785,000 and 630 000 cwt. during the corresponding period of the years 1884 and 1885 Nearly the whole of the Mauritius sugar imported into India is landed at Bombay, whence about half is re-exported to Sindh, Persia, Arabia, and other places, the balance being consumed within the Bombay Presidency. The natives of that presidency, especially of Gujarat and Kathiawar, which abound with Native States, are very partial to *ghee* and sugar. With the exception of Madras and Bengal, from which it imports about 70,000 cwt. annually, Bombay takes but little refined sugar from the rest of India. As regards the Mauritius sugar it is stated in a Resolution published by the Government of India in the *Supplement* to the *Gazette* of the 3rd February 1883, that "the imports of Mauritius sugar meet a distinct demand for crystallised sugars, which at present Indian manufacturers make very little attempt to supply." Again in the same *Supplement*, the Chamber of Commerce, Bombay, writes :—The committee are informed that the chief advantage which the Mauritius sugars have over Indian sugars is, that they are much more highly crystallised, which makes them more suitable for native confectionery of all kinds. In preparing sweetmeats the sugar has to be washed, and in this process, in its present form, the Indian sugar wastes about 5 per cent more than the Mauritius.

So far as Bombay is concerned, the statement is correct; but the port of Calcutta receives very little sugar from Mauritius comparatively, *i.e.*, the imports amounted to 156,000 cwt. for the whole of Bengal. The remark in the *Statesman* to which "Observer" refers meant, we think, that the imports of sugar from Mauritius during the month of December showed a falling off, as compared with the same period for the past two years. And this is perfectly correct, for the figures are as follows :—

December.		
1884	1885	1886
147,005	159,786	113 828

That India should go to other countries for what she can produce and manufacture herself to any extent, and of very superior quality, is one of those problems which, though easy enough of solution, must yet remain unsolved at least for another decade. This is a subject upon which we hope to have something to say next week.

DUMRAON AGRICULTURAL EXHIBITION.

No one will question that competitive shows, no matter of what character, tend very materially to encourage an emulative spirit. There is perhaps no branch of commerce which is likely to derive more benefit from exhibitions than Agriculture, especially in India, which is essentially an agricultural country. The only regret is that Agricultural shows in this country are so few and far between. It is quite different in England, where nearly each week witnesses a show of some kind It is therefore with peculiar satisfaction that we regard the establishment, as an annual institution, of an agricultural show by the Maharaja of Dumraon, the third one of which was opened on the 3rd instant by the Lieutenant-Governor of Bengal. Having heard that this exhibition was to be of somewhat greater pretensions than the two previous ones, we availed ourselves of an invitation from the Maharaja to be present on the occasion, not only to witness the show, but to judge for ourselves of the state of agriculture in the country around, the Demonstration Farm established by the Maharajah a short time ago, and in fact to make ourselve generally acquainted with matters of agricultural interest in Dumraon.

Before proceeding any further, we take this opportunity of making a few observations on the general system of holding such exhibitions in rural districts like Dumraon. To judge from the preparations made at Dumraon, one would naturally conclude that some great event was to be celebrated, The primary object of the gathering was said to be the agricultural exhibition, but as a matter of fact, it was made the occasion for entertaining a large number of guests by the Maharaja to what seemed to be general holiday-making and a sort of 'outing.' The guests were of course European ladies and gentlemen, the most honoured of whom was the Lieutenant-Governor of Bengal and his party. It appeared to us that prominence was given to races, the presentation of addresses by the Municipality of Dumraon and the Mahomedan community of Patna, dinners by the Great Eastern Hotel Company at the expense of the Maharaja, balls and suppers, and in fact general enjoyment, in the midst of which the exhibition of agricultural products sank into insignficance. We can, of course, understand a natural desire on the part of the Maharaja to accord loyal welcome to Sir Rivers Thompson in a manner befitting his high position, and to make it the occasion of much rejoicing,

*NOTE.—We are unable to reproduce this,—ED., *I. A.*

but at the same time it need not, in our humble opinion, have been made the occasion for such a lavish expenditure of money, the drain of which the coffers of the Maharaja could scarcely bear without inconvenience, to use a mild term It is not improbable that this entertainment will cost the Maharaja over a lakh of rupees. No one need, however, object to the Maharaja spending his money as he pleases, but what we do say is that the agricultural exhibition, the *real* object of the gathering, was subordinated in a manner that did not fit in with our ideas of such functions. And when viewed in conjunction with the policy of the Government to restrict useless expenditure as much in territories administered by the Government as in those ruled over by native chiefs, it was something of a satire. That the *business* portion of such occasions should be so far subordinated, as in the case of the Dumraon Show, is a matter for regret. We have noticed this tendency in other places, and we cannot help arriving at the conclusion that very little *business* is done, while the practical results would not, we fear, bear close scrutiny and criticism. One of the objects in view was, we understand, to afford the ryots of the Dumraon State an opportunity of seeing for themselves the advantages of using improved implements of agriculture, and of explaining matters to them which, upon a mere cursory view, would be to them simply incomprehensible. We certainly saw crowds of people, all very anxious to see things for themselves; but we fear there was very little 'explaining' done. They were hustled about in a very unceremonious manner, and could not have been much enlightened from what little they did see. We shall explain this later on, and will now proceed to describe.

THE EXHIBITION.

According to the prospectus, the show was divided into five departments, *viz.*, (i) cattle, sheep, poultry; (ii) agricultural implements; (iii) agricultural produce and raw materials; (iv) vegetables, fruits and flowers; and (v) manufactures. These were again sub-divided into classes.

In the way of cattle, there were not many specimens in the first place, and of those that were, we did not think of much account. The bullocks were small and poor in quality, but of course much superior to anything of the kind to be found in lower Bengal, while the bulls for breeding purposes were of the ordinary type to be found in most Indian villages. The milch cows appeared to be of a somewhat better class, but as there was no attempt made to test their milk yeilding qualities, it is not easy to pronounce an opinion. The buffalo we saw was a fine specimen. The sheep and rams did not present any features to distinguish them from those of the ordinary Indian type. There was one ram, however, with four horns, and a fine specimen he was. Among poultry there was one fine pair of English—breed cock and hen—Dorkings they looked like. The rest were of the ordinary kind. The special prize offered by Moulvie Fazl Imam for the best bred horse and mare in Behar, will, we fear, remain unrewarded; as we saw no horses of any description entered for competition.

In the class for grains we noticed some really fine specimens of white soft wheat from Sasseram. The Mozufferpore variety was also well represented; while the soft and the hard red varieties were of so many kinds, that it is a little difficult to assign the first place to any particular specimen There were some really good, and some very poor. Rice and paddy were largely represented, and the competition was very keen. Barley and oats were well represented—particularly the former; but we cannot say the same for Indian corn, of which there were very poor specimens in cobs, although in grain, we noticed one very fine variety, The competition was however very keen in wheats. The millets were generally well represented, espicially *juari* (known in Behar as *Jenera*) of which there was one particularly good specimen. Among pulses, gram (*Chana*) formed perhaps the most noticeable feature. The pigeon-pea (*arhar*) was very poor. There were not many exhibits of oil-seeds, but those staged were of good quality, and it will, we think, be a little difficult to award the prize to the best. The classes of raw fibres might have been left out altogether, for the few specimens staged were of the very poorest description, especially cotton. We have not seen worse specimens. There may be a reason for this as cotton forms but a small proportion of the crops grown in Behar. This was evident to us while journeying to Dumraon. In the class for spices there was keen competition, the specimens of *chilis* (Cayenne pepper) were some of the best we have seen, especially one stand of capsicums, which would do credit to any market-gardener in England.

The miscellaneous class comprised tobacco, sugarcane, jagri, honey and wax and lac. Behar is well known for its tobaccos, but we were disappointed at the insignificant specimens staged. This may perhaps be due to the season during which the exhibition was held, for we noticed large plantations of tobacco while on our way to Dumraon, which, when harvested, will doubtless produce good crops. The Sugar-canes were also very poor, and were of the ordinary type, with the exception of one tolerably good stand, the rest were of the common *ukh* variety. There was nothing to compare in the smallest degree with the splendid canes grown in the North-western Provinces and the Punjab, especially in the Saharunpore district. It might not be out of place to suggest here that the Bengal Agricultural Department would do a good thing by introducing the Saharanpore cane into Behar where, we feel sure, it would grow to perfection. Dye plants were few and not of any pretensions. The dye most extensively cultivated in Behar is indigo, and next to this comes safflower (*kusum ka-phool*), It is however not to be expected that anything worth showing could have been got ready within the short time allowed for preparation. We hope to make a few observations upon this subject later on, and will continue our review of the exhibition next week.

THE INDIAN FOREST SERVICE.

It is announced that an open competition for the Forest service in India, will be held in London in June next, when not less than ten probationers will be selected. The examination will be open to all natural-born subjects of her Majesty, but they must be unmarried, and above 17, but under 21 years of age on the 1st of June 1887. The subjects of examination form a somewhat wide curriculum of studies, in which the Latin and Greek languages give place to German and French. The service can have no attractions whatever for English youth, and as its conditions become known, it will much surprise us if any applicants whatever, present themselves to the examiners. For if the candidate is successful in the competitive examination, it does not by any means follow, that he will finally secure an appointment to the service. The competition is but the commencement of a series of examinations, recurring periodically, while the probationer is under what is called a course of training at Cooper's Hill College, extending over nearly two years, at an annual charge of £180, to be borne by his parents or guardians. At 22 or 23 years of age, and after an expensive education that cannot have cost his parents less than £250 a year, from the time he was 14 years old:—if the boy's character is good, his physique strong, his sight and hearing perfect, and he can ride well, he *may* get an appointment in India, to the magnificent position of an Assistant Conservator of Forests on Rs. 250 a month, from the date of his arrival in the country. Particular stress is laid, in the rules for admission, upon the applicant's good vision and hearing. "Means are taken to test his physical powers of endurance"—we hope not by making him qualify as a '*fasting man*,'—*and all these* formidable preliminaries result in the chance of the young man securing an appointment in the forests and jungles of India, upon the extravagant pay of £170 to £180 a year (Rs. 250), with no prospect before him whatever. He must pass through no less than seven grades of the service, before he becomes a third grade Conservator, upon about £650 a year. It is a mockery and a snare, to parade such a service before English parents, who know little or nothing of the conditions of service in this country. Take the case of an English boy at 15 years of age, whose parents or guardians are prepared to spend £2,000 upon giving him a fair start in life. Under this shameless Cooper's Hill fraud the boy's friends are induced to spend £250 a year, for seven or eight years, upon his education, to procure for him the chance of spending his life in the jungles of India, upon a salary of £180 a year rising to £700. An English boy who

has been under good tuition from 9 to 15 years of age, is well fitted to become an apprentice in any profession or business whatever, while if his friends have £2,000 at their command to give him 'a start in life,' they can place him with the greatest ease, in circumstances in which he may secure a junior partnership in the firm that has educated him, at the very same age at which the victimized candidate for a life in the jungles, is offered the magnificent salary of £170 a year. Cooper's Hill is a fraud upon both nations, while it is kept up at indefinite cost to the people of this country, who have already been made to pay well on to half-a-million sterling, for its foundation. It is necessary to speak plainly upon this subject. There is no reason whatever, why the Government should not have a large forest school in India itself,for training native youth for the exclusive filling of these jungle appointments. It may be, and no doubt is, desirable to have two or three highly-qualified men of European training, at the head of every provincial branch of the service, but that exhausts absolutely the need for European officers. And in a very few years' time, even *that* need will disappear, India herself producing a school of Forest officers, second to none in the world. The simple truth is that in the midst of endless protestations of our desire to rule the country wisely, every branch of the public service, upon one pretence or other, is made a preserve for Englishmen. Native youth, including the Eurasian community, are practically excluded, because their friends cannot possibly face the costly regulations, which require them to pass these ordeals in England. What person of common sense fails to see, that however real may have been the necessity for European guidance in the establishment of the Forest service, that need has now gone, and that it is in India itself that we should now recruit the service, without a thought of resorting to England for the purpose. The service has ceased to offer a career to English youth, and it is only to impose upon the mother-country, to keep up the pretence of such a career for its sons. The schools of this city alone—such schools as the City College, the Doveton, St. Xavier's, the Missionary schools, and others—are turning out every year, boys in large numbers, for whom all appointments in the Forest, Opium, Police, Land Settlement, Post Office, Telegraph, Railway, and Account departments, should be reserved. England will still have not only her own home service and colonies, but the highest appointments in India as a legitimate career for her sons while to train them highly and at the expense of India, for competition in the services that we have named, is a wrong both to the mother-country, and to its great dependency. The only satisfaction we have in reviewing matters, is the inclination of the Government to accept these views, but unless the public press drive the conviction home, the Government will move only with the proverbial slowness that characterizes its action in all reforms.

THE GERMAN SUGAR INDUSTRY.

The German nation has been blamed very much in the matter of its sugar policy, and one of our German exchanges has taken the trouble to go into the matter thoroughly. We reproduce the article below :—

Among the numerous German industries there is none which has attracted so much public attention these last few years as the sugar industry. This is partly owing to the reforms instigated by the new laws relating to sugar taxation, and partly owing to the enormusly increased production of the article since the beginning of the present decade. It is a well known maxim that "one cannot please everybody" and consequently we are not surprised to find a few people shaking their heads at this development, and hinting mysteriously of the evils accruing to *over* production. We say a *few* people because there are many who are on the other hand inclined to look with nought but a favourable eye upon the extraordinary progress the industry has made, and point as a proof to the remarkably increased export trade of sugar to which Germany has attained, which export it is impossible to deny, must have a beneficial influence upon the political economy of the country. Turning to another side of the question, we have long remarked on the fact of the great statistical attention which is paid in the Press and elsewhere to the sugar *production*, and have wondered why a perhaps equally important desideratum, namely the *consumption* of the article, has received but very scant attention at the hands of statisticians. Accordingly we have taken the trouble to gather from reliable sources figures which go to show that the amount of sugar consumed in Germany between the years 1874 and 1879 amounted on the average to 6·55 kilog. per head of the population. From the same source we also gather that the fatherland stands at the foot of the principal sugar consuming nations, and further that the sweet tooth of the Britisher is unmistakeably evidenced by the fact, that his country, occupying the first place, is 40 per cent in advance even of the United States of America, which occupies the second post of honor. During the last 5 or 6 years the sugar consumption, keeping pace with the production has experienced an important increase, bringing the average disposal of Germany per head, up to nearly 9 kilog., Great Britain still retaining the lead with an increase of about 15 per cent. This augmentation is attributable no doubt to the extraordinary relaxations in price which have taken place during the period mentioned. This again of course is only to be attributed to the remarkably increased production.

Whether this extraordinary development of the sugar industry, in view of the unprecedently low prices, will confer all the benefits which may at the first appear very probable, we leave our readers to judge, and for further details concerning this important and interesting subject, we give below a table showing the average consumption per head of the population of the chief sugar consuming countries, in the periods mentioned :—

Great Britain	...	1876-80	28 07 kilog.
United States		do.	17·11 ,,
Denmark		1875-79	11·70 ,,
Holland		1878-79	10·80 ,,
France		1876 79	8 50 ,,
Switzerland		1875 79	8·34 ,,
Germany		1874 79	6·55 ,,

From these figures it will be seen that Germany occupies an unenviable position, if a large disposal of saccharine matter is deemed a desideratum. Great Britain's high average is as remarkable as Germany's low one. The consumption in Germany during the first 5 or 6 years of the present decade, has increased in an astonishing manner, showing a total of about 4,000,000 metre centners, which distributed among 45,000,000 people (the population of Germany) gives an average, per head of nearly 9 kilog. Great Britain's average consumption in the meantime having increased to 32 kilog. To the extraordinary low price of the article is attributed this remarkable development, and further to the astonishing headway that the German beet-root sugar industry has made, is assigned the reason of the price and its downfall. Take for instance the sugar consumption of the season 1884-85, which amounted to 3 500,000 metre centners ; had this quantity been reconed at 66mks. the average price of 1883-84, instead of 57 it would have entailed upon consumers an extra expenditure of 31,350 000mks. Comparing in a similar manner the sugar prices of the last 5 seasons with those of the previous 70 years we find that the following sums, in the respective periods, have been saved to consumers, mainly through this falling off in price.

1880 81	...	...	... 35,000 000 Mks.
1881 82	...	...	... 31,000 000 ,,
1882 83	...	...	... 60 000,000 ,,
1883-84	...	...	... 88 000 000 ,,
1884 85	...	...	... 116,000,000 ,,
			Total 330,000,000 Mks.

If we estimate again for 1884-85 a German consumption of 40 000,000 metre-centners and compare so recently as 1881-82. 81 mks , and 1884 85. 57 mks., we find that the consumers of the latter period, had prices remained as they were in 1881-82, would have had to expend further, the enormous total of 100 million mks. At any rate the so-called over production has been the reverse of unfortunate for them. We might then venture to hope that the sugar consumption will still continue to give evidence of remarkable extension, especially as the German refineries are doing their level best to adapt their wares to the different requirements and tastes of the consumers, For instance several of the refiners are now issuing as a convenience to the public "wurfel" sugar. For the information of our readers who may be in the dark on this point, we may say that this term indicates that the sugar is "sawn" (by machinery) into pieces from about ¼" to ½" thick and about 1¼" × 1¼" thus saving the people the necessity of breaking their own sugar, a proceeding which is more or less naturally attended with waste. Besides care has been taken that the sugar shall be of the very best quality, such a quality as within a few years ago was only to be found in that sugar consuming land *par excellence*—Great Britain.—We can only hope that these praiseworthy efforts on the part of the

refiners to adapt their produce to the convenience of the consumers will not go unrewarded, especially when considering once more the low price of the commodity.

Duty was paid on the following totals from the 1st August to the 31st December last year:—

States.	Raw Sugar. kg.	Crystallized sugar kg	Other white sugars kg.
Prussia ...	246,206,602	44,446,595	6,047,083
Thereof :			
West Prussia ...	59 761,849	—	5.070
Pomerania ...	40,49[illegible],356	6,356.809	1,203,288
Saxony ...	18,608,416	14.317,571	1.388,038
Schleswig-Holstein	73,913,198	8,026,956	761,616
Hanover ...	38,129,966	2 220,739	2,578,856
Rhine Provinces	7,124,574	11,115,203	3,572
Ba[illegible]ia ...	1,458,303	3,582 658	—
Brunswick ...	2,147,631	4,336,991	281,801
German Customs ...	259 840,993	53 326 041	6,328 884
Against 1885 ...	183,437,989	19,352,406	8,561,930

The sugar manufactory at Lutzen last year converted 547,560 centners of beet-root. The tax paid on it to the State amounted to 465,426 mks.

COTTON-CROP, N.-W. PROVINCES AND OUDH, 1886.

The final forecast of the cotton crop of 1886, in the North-Western Provinces and Oudh, is a very satisfactory one indeed. As it is of importance that the forecast should be properly understood, we print the official report *in extenso* below :—

The total area of the previous year (corrected by omission of 'manna' or 'radhia' cotton which flowers in March) and the area under the present crop are shown, division by division, in the following table :—

Division.	Area under cotton in 1886.			Total area under cotton in 1885.	Total average area during 1875 85
	Pure.	Mixed.	Total.		
Meerut ...	179,883	220,771	400,654	361,597	299,282
Agra ...	62,750	514,268	577,018	517,131	378 747
Allahabad ...	10,011	446,660	456,671	424 226	395,6 0
Jhansi ...	10,010	70 955	80,965	80,616	82 427
Tarai ...	2,470	3,836	6 306	2 997	5,90[illegible]
Rohilkhand .	45,463	181,376	226 839	181 739	179 392
Benares ...	5,668	13,866	19,534	14,811	17,959
Total North-Western provinces.	316,255	1,451,732	1,767 987	1,583,117	1 359,367
Lucknow ...	5,171	45,375	50,546	37 202	19,632
Sitapur ...	5,470	32,389	37,859	28 626	22 748
Fyzabad ...	717	496	1 213	3,693	9 083
Rae Bareli ...	1,520	1,997	3,517	2,509	2,416
Total Oudh...	12,878	80,257	93,135	72,030	53,879
Total North-Western Provinces and Oudh.	329,133	1,531 989	1,861,122	1,655,147	1,413,246

The present area thus exceeds that of the previous year by 205,975 acres and the 'normal' area by 447,876 acres, or taking 100 to denote the normal area, the area of the present crop stands at 131. This large excess is chiefly due to the early setting in of the monsoons and the generally favourable season. The large excess over last year is in some measure due to the wholesale destruction by floods of large tracts of cotton in 1885.

Condition.—The information under this head has been obtained from the selected zamindars of districts. The average condition of the crop according to their bulletins is noted below:—

The Doab ...	70	Taking 100 to present full average crop.
Bundelkhand ...	40	
Rohi[illegible]and and Tarai ...	66	
Benares Division and Jaunpore ...	50	
Oudh ...	50	

Outturn.—Adopting the standards of full outturn accepted last year and modifying them in proportion to the condition of the present crop, the total outturn of the 1886 crop would be 45,000 tons. If the local consumption be put at ¼ of a lb. per head of population which is believed to be very near the mark, the total quantity required for local consumption would be about 15 000 tons, leaving 30,000 tons for export.

Stocks and Trade.—The total outturn estimated last year was 40,000 tons ; the net export by rail from 1st October 1885 to 30th September 1886 amounted to 38,370 tons. Traffic by road was not registered during the year ; in 1878-79 the imports from Rewah, Native Bundelkhand, Gwalior, Rajpootana, and the neighbouring districts of the Punjab amounted to 11,967 tons ; the imports from Bundelkhand and Gwalior during 1885-86 have, according to the merchants of Cawnpore, been much larger than in 1878-79. Taking the total imports by road at 15,000 tons, the surplus left out of the previous crop was a little over 1,600 tons :—

	Amount.	Total.
Outturn of 1886 crop	40,000	
Imports by road during 1885-86 ...	15,000	
		55,000
Export by rail ditto	38,370	
Local consumption	15,000	
		53,370
Balance left in stock		1,630

Thus the stock of cotton in the United Provinces at the end of the harvest may be estimated at 45,630 tons.

Miscellaneous Items.

The receipts from eleven sales of Bengal opium and ten month's pass duty on opium exported from Bombay have fallen Rs. 6,63,415 below the estimates. But the receipts at Bombay show a large surplus.

The quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 18th of January was 1,43,535,710 lbs. as compared with 1,45,367,080 lbs. exported in the corresponding period of last year. The exports to the United States and Canada during the same period were 85,581, 604 lbs. as compared with 75,963.439 lbs.

Writing of the curative powers of the lemon fruit, of the virtues of which our friend Dr. Bonavia has written so strongly, an American exchange says :—Lemons are one of the most useful fruits in our domestic economy. The juice of half a lemon in a glass of water, without sugar will generally cure a sick headache. If the hands be stained, there is nothing to remove the stain better than a lemon, or a lemon and salt. After the juice has been squeezed from the lemon, the refuse can be used for this purpose. Lemon juice is also a very good remedy for rheumatism and the so-called biliousness of spring. In the latter case, the juice should be taken before breakfast. The pulp may also be eaten, avoiding every particle of skin. Lemon juice and sugar, mixed very thick, is useful to relieve coughs and sore throats. It must be very acid as well as sweet. As a drink, lemonade is not only a luxury but exceedingly wholesome. It is a good temperance drink. Hot lemonade in the winter will break up a cold if taken at the start. Cool lemonade in summer will refresh one who is tired and thirsty. As a harvest drink it has no equal. There is no danger in taking too much, and it never produces drunkenness or disease.

The following hints on repotting roses might be of use to some of our readers :—The general practice is to report every year, taking away as much of the old soil as possible and replacing it with good loam, with an admixture of rotten dung. The most favourable time for so doing is in the middle of November, as the operation of re-potting and pruning can then be simultaneously performed. After potting, a moderate watering should be given, and from that time until growth recommences, but little water will be needed. It is not, however, absolutely needful to report annually ; some of the finest pot roses ever exhibited at the London shows has been *four* years in the same spots, and we have grown excellent roses in the same way. Instead of repotting, remove as much of the surface soil as possible, and replace it with good loam, with a good admixture of bone-dust ; make it as hard as possible. When the plants come into full growth they should get a sprinkling of some artificial manure, and this should be renewed when the buds are well formed. When roses are grown in this way they require more water than when shifted, as the spots are full of roots. The soil should never become quite dry from the time the first leaves are fully formed.

Whether on the fields or in the garden, an important winter work is the clearing up of the rubbish and weeds that, while they were kept down early in the season, have gained the mystery in the midsummer days, and in autumn present a heavy growth

in field and garden. What shall be done with them? Weeds, in growing take from the soil the same plant food as do the plants of our crops. If we can turn under, while yet green, a crop of weeds, it is often as valuable in enriching the soil as if we had turned under a crop grown expressly for green manuring. But in late autumn the weed crop, having lost its succulence and become dry, is no longer fit for turning under. Still, the weed crop has taken up from the soil potash, phosphoric acid and other plant food, and stored them in its stems, &c. These are just such materials as the cultivated crop will need next season. To turn under the weeds at that time would be to re-seed the land with them. If they are taken to the barn-yard or piggery, to be worked into manure, the seeds will still remain and bring trouble next season. The only proper treatment for weeds gone to seed is to burn them. All that they contain of value to the crop of next season is left in the ashes. To burn the weeds and apply their ashes to the soil is a mark of good farming.—*American Agriculturist*, for January.

THE nutriments of the various forms of good are not generally known. The following notes from the *Farmers' Review* may therefore be noted with profit:—Fat pork contains a large amount of nutriment. Butter has 870 per cent of nutritive matter. The The pseudo-butter, oleomargerine, has about the same value in this matter, when pure. In a pint of milk and a pint of oysters there is the same amount of nutriment, although the oysters contain more proteine and the milk more fat. Cheese contains a large amount of nutrition Fish is less nutritive that meats, but five pounds of nutritive being obtained from a hundred pounds of material. It usually contains about five per cent. Salt mackerel is among the most nutritive and flounder is one of the poorest. The breads representing the carbohydrates contain about thirty-three or thirty-five per cent of water, flour from nine to thirteen per cent, corn and maize meal still more water. They have less proteine and more fat; oatmeal has, on the contrary, more proteine and less fat. In general, this class contains most all nutritive material and but little water. A pound of potato, however, contains a large amount of water, and but little proteine. The figures on which the statements are based are not so satisfactory as could be desired, as most of the experiments have been carried on in Europe, especially those of the animal foods. The vegetable foods have been more investigated in this country than the animal.

WHOEVER undertakes to grow house plants, says an exchange, enlists for a war against a dry atmosphere, dust and insects, and the greatest of these is insects. The most injurious insects are not those large enough to be removed by hand, but the minute plant lice or *Aphides*, called by the gardener Green fly. No sooner does a new and tender shoot, two or three inches long, push forth, than it is beset all over, round and round, with these innocent-looking insects, as close together as they can stand, each with its little snout (proboscis, if you like it better) stuck into the tender shoot, and all sucking away for dear life. The insects grow, but the shoot does not. Tobacco in some form—dust, tea or smoke—is sure death to these little creatures. Smoke is best, as it is most penetrating, or "sarchio," as the old-fashioned folks say. In the greenhouse this is the most readily applied form of tobacco, while in the window garden the most difficult. Still, if one is really fond of plants, and smoking is a condition of success, ways and means will be found to apply it. If one can have the use of a closet, or the exclusive use of the bath-room for over night, smoking becomes easy. In smoking, we wish to burn tobacco, and do not wish to burn the house. It will be well to make a shallow box or tray, say four feet square, with sides four or five inches high; fill this with coal ashes, and it will make a hearth upon which a fire may be built with safety. A handful of pine kindlings is placed in the middle of this hearth; when fairly ablaze a lot of damp tobacco stems are laid upon this fire and the operator should retire and close the door behind him. Of course it is supposed that the plants have been removed from the window to the bath-room before this smoking is given.

TRADE-MARK CASE.—Some time since an action was brought in Brussels against English dealers in extract of meat, to prevent them from using the title of "Baron Liebig's Extract" or from placing the photograph of the late Baron Justus von Liebig on their jars or in any way using the name or title of Baron Liebig. The action was brought by the Liebig's Extract of Meat Company, and was successful. The English dealers thereupon took the case into the Court of Appeal. The judgment was given last week, confirming the decision of the Tribunal of Commerce and condemning the English dealers, who were defendants in the action, to pay damages and also restraining them from making any further use of the name of Liebig or Baron Liebig, or of the photograph, this right being declared to be the exclusive property of the Liebig's Extract of Meat Company.—*Times*.

Selections.

ERECTING WOODEN PALINGS.

THE question is sometimes asked, why so many wooden palings are erected all over the country, seeing they are of so perishable a nature?—and the counter question is also as freequently asked, why there are not many more of them erected, and the work done to better purpose than it commonly is? Several very sound reasons may be given for the general adoption of wooden palings, and also for their disparagement. In the first place, on most landed estates wood is conveniently at hand for the purpose, and can be transformed into a fence in the very shortest time possible, while stone, iron, or other description of fence would be out of date before it could be available for the purpose. It is no uncommon thing for a tree to be growing in the plantation in the morning and be in the position of a fence in the evening. Second, temporary fences are often urgently required by those who cannot afford more permanent and substantial ones than those of wood. Third, wooden palings can be put up to answer the purpose required, by almost any unskilled person. Fourth, there are few places were fences are required, but that the work may be done with wood in some way or other. A fifth reason also is that of making use of a product which if not used for fencing purposes, would be entirely lost to the proprietor. Young thinnings which would not pay to convert into other purposes, such as pit props (now that they are so cheap), would be entirely lost to the proprietor if not thus used for estate fencing. These are among the most common reasons for erecting so many wooden palings. And now a few remarks as to why many more are not erected, and also why the work is not better and more tastefully done. One reason why wooden fences are supplanted by iron, stone, &c, is because the latter are more durable and permanent. Second, because iron and stone afford greater strength and resisting power where grant resistance and strain are to be provided against. Third because the appearance of stone walls, dykes, iron and wire fence is generally more appreciated as an object of taste than wooden palings are. The reasons and arguments for and against wooden palings are neither new, fanciful, nor absurd, but based upon the old common sense lines of adaptation and propriety, namely, each kind and description of fence in its own place and for its own specific purpose is the best.

In forming a hop garden, for example, where neither hedge nor tree exists, a shelter fence of poles may be erected in a day, which would not cost many shillings and would save the hop-grower many pounds and stand secure till a poplar or willow hedge would grow up and take its place. Again in a pasture field where the firm is under a rotation of cropping and the grazing transferred annually from one field to another, under such circumstances how cheap and simple it is to erect a composite wooden shelter for stock in the field thus grazed and transfer it to other fields, as the rotation goes on. Nor are such shelter fences alone useful in cold weather but they are almost equally beneficial on hot days in summer, especially under the tormenting influence of insects great and small which harass and injure the animals. The question of permanency, however, is so paramount that unless most kinds of wooden fences will endure a given number of years, they are of all others the most expensive; for although the wood in the plantation costs almost nothing yet if it does not remain strong and endure a certain length of time, it will not pay for the nails and labour used in erecting it. That soft wood, as a fence can be made to last three or four times longer by means of creosoting than it would otherwise do, is now a well established fact. The disagreeable smell, however, and everything connected with the process of creosoting is so offensive, that it is highly desirable to find some other preservative as a subtitute for it. A compound of lime, salt, potash, and sand, boiled made into a paset of the cons'stency of cream, not only adheres to the wood (especially as it comes from the saw) but preserves it in remarkable manner for all outside purposes. Oils and grease of every kind have a preservative influence upon wood and would be used if only cheap enough. I have of late, however, made what I trust may prove a successful discovery of a new wood presentative in that of alum. It is melted in water and the wood either steeped in it; or the liquid may be app'led to the fence or other wooden structure in a manner similar to that of using oil point. Not having sufficiently tested the process, however, so as to state confidently the relative advantages of it, more need not here be said in the meantime, beyond a friendly advice to give it a trial.—*C. Y. Michie, Cullen House, in Gardener's Chronicle.*

THE PROGRESS OF ENSILAGE

I.

SIR —In past history a certain mountain was once said to have laboured—and brought forth a mouse. I would not, really, write one word offensively of or to 'Old Style'—no doubt he is tarred very fully with the same brush of prejudice as he gives us believers in the system of ensilage the credit of being—but he is certainly not practical, or he would prove for himself, and not criticise statements of cost, &c, &c, that may be very extreme or unreliable. We all know that one man will get his work done much cheaper than than another, and so the cost of making ensilage, like that of hay, will always vary under different circumstances, and in the hands of different men. 'Old Style' and myself have much more important work to do than thrash the wind or figures that other men put before us—let us leave that question to be worked out by the practical men who already have it so well in hand. 'Old Style' is not 'cruel' in the attempt to prove our system as

'exploded fallacy' just yet. Mrs. Partington's broom would not keep the tide back when she was said to have tried it many years ago—600, silos in 1884, 1,200 in 1885, and 1,600 in 1886 (to say nothing of stacks) is not an unhopeful sign of healthy advance in the system of ensilage. I am not really 'astonished' at anything 'Old Style' may put in print, for he is so very intensely one-sided in this matter, and his last letter is a sample of it. Why does not 'Old Style' tell us that the deadly 'spores of fungi,' which neither hot water will kill or cold affect—and which he writes so warningly against, as being generated round the outsides of ensilage stacks—may be found in countless millions in every pasture field of our country, and around every decaying vegetable substance that exists. These 'spores of fungi' are no new discovery, but are like our own race—long dwellers on this earth of ours. From boyhood I have been told that germs of disease and spores of infection are in every breath I draw; but I live and enjoy life in spite of it. A scientific gentleman has, I see, just proved beyond dispute, with chemically prepared sheets of paper, that the air in midatlantic is absolutely pure, while the state room on the steamer's deck is impregnated with germs of all manner of diseases. Useful knowledge, perhaps; but just that which will not affect the ordinary threescore-and ten traveller much.

One practical proof of the use of ensilage, and I close once more this little set-to over ensilage. A working farmer in Monmouthshire, milking 50 cows for the South Wales milk trade had in the year 1883 two fields of meadow grass cut for hay. The weather changed from fine to wet, and the grass laid several days developing 'spores of fungi,' and rapidly spoiling. My friend had heard of ensilage, and in place of utterly spoiling his grass in the vain attempt to make hay, he carted it, wet as it was, into one end of his barn, with the practical result that he had good ensilage, which made first class milk. That experiment and the knowledge gained convinced my friend of the value of ensilage, and ever since he has put away a considerable quantity both in silo and stack. Now, his brother-in-law, another working farmer and a milk man, has, after hearing that his brother-in-law saved £50 in his cake bill last season by the use of ensilage, put up a good 60 ton stack last summer, and is now feeding it to his milking cows. Men such as these are too hard-headed (thick-headed perhaps 'Old Style' will say) to be easily turned aside when once convinced of the value of any new system of farm practice. A merry Christmas and a happy New Year to 'Mr. Old Style,' and may we to 'Lang Syne' together in the spirit, though so far apart in belief and flesh.—Yours, &c.,

JAS. HUNT.

Westbury Park, Bristol.

II.

SIR,—Your correspondent 'Old Style' seems to think that by substituting vehemence and numerous marks of exclamation for arguments that he will carry all before him 'When I ope' my lips, let no dog bark,' he evidently thinks, ought to convince the world and settle all controversy, His liveliness of imagination cannot possibly do any harm. Fortunately for the country, ensilage is now beyond the range of experiment, so far as the general determination of its use and importance are concerned, and this method of preserving green crops has been found to be of such high practical value as to place the system beyond question.

There are many ways of making ensilage, both as to cost and method, and particular cases and circumstances may modify the advantages to be got from it; but overwhelming testimony in its favour establishes beyond doubt the value of the system. 'Old Style' becomes very witty and wise over the origin of this method of preserving fodder, but we all know before that the ancients, in a rude sort of way, in holes and pits practised the art; and it is an argument in its favour, and not against it, as 'Old Style' seems to think, that the 'Mexican' he refers to, the Algerian, the Italian, and many others of our own day, still preserve green crops in this way.

The profitableness of ensilage is more and more demonstrated every day. Only three weeks ago, at the Smithfield Show of Ensilage, the champion cup and first prize went to stack silage, showing that we can have the best of ensilage without the expense of a silo, and with almost no waste, for another prize for stack silage showing the outside—taken by Mr. Blunt, Leicester—proved that it can be made with only a few inches of destruction at the edges; while a third case was that of a prize given for ensilage made from common bracken or fern. The samples in this were all nearly perfect, and plainly show that good appetising food can be made from what has hitherto, and by the system which 'Old Style' advocates' been completely worthless. A method which can preserve and utilise the east, product of thousand, of acres in Scotland and England, must surely be a notable economy on the farm.

'Old Style" should study the *Transactions* of the Highland and Agricultural Society for this year. He should learn in silence, and in the above record he will find much valuable instruction upon ensilage.

As to cost, the comprison is immeasurably in favour of ensilage, for the crop, cut and disposed of at once in a stack place in the field where it grew, must save much of the time and labour necessary to hay making. In wet seasons the odds against the latter would be ten fold-not to mention ruin to the quality of the hay.

'Old Style' is unnecessarily alarmed. He need not dread '*spores* of *fungi*,' provided proper precautions are taken to make good ensilage. The process is an extremely simple one but if, through gross carelessness, or ignorance, or prejudice, the pressure used is only intermittent, and the crop gets into a bad state, while fermentation goes on, contact with the air might cause the appearance of *spores* of *fungi*, but if a right press is used (such as Blunt's patent), which gives *continuous* pressure, no such growth is possible. After experience, practical farmers find their stock thrive, and ready, and in good care, for going to grass in spring; while Professor Kinch and Mr. Lloyd substantiate their statements by contributing valuable analytical information in support of ensilage, Dr. Emmerson, the analyst, says—'The only possible objection to silos can be when they are imperfectly constructed, so as to allow more air to reach the enclosed vegetable matter than admits of oxygenation beyond a certain amount, and decomposition begins; then, of course, the food would be unwholesome' The cure for this is simple—use sufficient weight, and see that it is *constant*, upon your stack or silo.

'Old Style' is probably much too prejudiced upon this subject ever to try it, or benefit by advice; but for behoof of wiser men I would add that there is a wide difference between good and bad ensilage, and to secure the former I would counsel them to act upon the subjoined maxim, given by an experienced ensilage-maker:—'I cannot impress on intending silage makers too strongly the absolute necessity of giving personal attention; without it, and in the hands of a careless or sceptical subordinate, the result would certainly be disappointment.'—I am, &c.,

HELP IN DISTRESS.

FACTS IN FAVOUR OF ENSILAGE.

SIR,—In case there may be a few amongst your numerous readers who will be prevented by the account given by your correspondent 'Old Style' from trying the system of ensilage for themselves, perhaps you will allow me to give a few facts in favour of this system.

As to the advance the system has already made, I think it would be difficult to find anything connected with agriculture that has made such rapid strides, and this present year will show greater advances, still, not perhaps in the number of silos, but in ensilage stacks. These in my county have to my knowledge increased as ten to one The cost of making silage will, of course, vary in different districts. Feeling anxious to obtain some reliable information as to the cost, I made 20 acres of grass into silage, and noted carefully the cost, which, including 5*s*. per acre for mowing with the scythe, came to 12*s*. per acre, the hay off the same 20 acres usually costing me at least 15*s*. per acre.

If an ensilage stack is well and properly made, the waste at the sides will not exceed 6 inches in depth, with none at the top or bottom, amounting in a fair-seized stack to something between 2 and 3 per cent. I believe there are very few seasons when a stack of hay can be got without showing, by waste at the sides, roof, and moulds, a less percentage than this.

As to the cost of feeding on silage, I offer the following figures, from which any one sufficiently interested in the subject will be able to work out the actual cost for themselves. But first allow me to say that in keeping animals altogether upon silage we must study to give them the sort most suitable for them, because what may suit one may not another. Cows in milk and young stock in the sheds should have a green-coloured silage made at a temperature below 140 degs.; horses, either at work or lying out in the fields, and cattle in the fields, should have a dark-coloured silage made at a temperature over 140 degs., or, better still, if made at 160 degs Of course, if the silage is wanted for feeding purposes, the nature of the crop must be considered; for this I think there is nothing better than tares made at a temperature of 140 degs, This, with a portion of green silage, will, I feel sure, give most satisfactory results to any one with feeding stock. I have found from actual experience that a calf at six months old, without any other food except 1 lb. of linseed cake, will consume about 20 lbs. of green silage per day; at eight months old, 35 lbs. per day. A cow in full milk, without any other food, will consume about 70 lbs. per day. A horse in the stables doing fair work will eat from 40 to 45 per day in addition to his feed of corn. A young horse in the field during the winter will be kept in good condition with 14 lbs. of silage per day.

Your correspondent asks the question, 'Has it (silage) any feeding qualities.' His answer at once is in the negative, more decidedly in the affirmative, that is if the crops of which the silage is made have any feeding properties.

I sold two fat beasts last week. Their food since they came into the sheds consisted of one hopper (about 40 lbs) of swede turnips, 4 lbs, of linseed cake, and as much silage as they would eat each per day. The silage was partly meadow grass and green, and partly tares dark-coloured, and made at a temperature of about 150 degs. The butcher who bought them sent me word last Friday that they turned out exceedingly well when killed.

For three years now I have used silage very largely in feeding different kinds of stock. Last winter much of it was made in stacks, this year the whole of it, about 300 tons. The outside damaged silage is carted and spread out in the fields, where the cattle pick it over and eat what they choose of it. Up to the present time I have had no case of illness amongst any of the stock, so you will not be surprised when I say I do not attach much importance to the theory of disease by 'spores of fungi.'

I quite thought, till I read your correspondent's letter, that the scare about spoilt milk and butter was thoroughly thrashed out; but if he will allow me I would advise him, before making up his mind on this part of the subject, to write to some of the managers of the large London dairies and ask them their opinion. I know one or two firms who now give the preference to those farmers who use silage, and one firm in particular that offered 1d, per lb. more

for butter produced on farms where silage is used. I am quite certain the use of silage enables us to have as good butter in the winter time as in the summer when the cows are at grass. That you may judge of this yourself, I have much pleasure in forwarding you, per parcel post, a sample of butter made from the milk obtained from cows that have had nothing the last two months but silage and cabbage.—I am, &c., EDWD. P. BLUNT.

December 18, 1886.

FACTS ABOUT ENSILAGE.

SIR,—'The new Argonauts' in search of the golden fleece, are certainly hopeful and also vociferous, but in the latter they show philosophy, for in these days if any one starts anything new, and makes himself heard loudly enough, he has every probability of having many to hollos, in his hunt. These remarks have no relation to your correspondents, but are called forth by the extraordinary way this system has been taken up by learned bodies, agricultural societies, ensilage congresses, and other organisations, for the extraction of 'sunbeams from cucumbers,' for the regeneration of a falling agriculture, and I know not for how many other purposes as well. But though 'Old Style' has lived long and seen much of his countrymen, he could not have thought the force of example has such a tremendous power of draw as is shown in this ' new expedition to Colchis or to Coventry, he cannot tell which ! Most of all is, he is astonished at the extraordinary development of the doctrines of Hegel ! ' Inner consciousness' he has always thought was regarded as an unsafe guide by which to direct the affairs of life, and particularly did he think that in Scotland solid proofs rather than mere opinions arrived at by 'inward light' would be necessary to make a system of half-rotting the fodder pass current with the people as an improvement on the good old-fashioned method of making hay. But the letters of your correspondents show that this movement has spread north, and on public grounds it is desirable that the subject should be thoroughly thrashed out, because there are many engaged in farming who can ill afford to throw away any of the remaining portion of their capital. In former letters there has been a little mild banter, but in this I will endeavour to put the whole subject before your readers in a way that those who have not been accustomed to deal with intricate matters of this kind may fully understand it, and if they adopt it afterwards, and lose by it, they will have only themselves to blame. To lay a foundation for the arguments that follow, I shall have to state in a rough and ready way the chemistry of making grass into hay and into silage, giving where necessary, authorities in brackets, as the description proceeds:—Grass when cut fresh contains (Voelcker) 85 per cent of internal moisture, when dried and fit to lead as hay it will contain about 31 per cent, (Cameron) of its then weight of internal moisture, and after sometime in stack 14·15 per cent. of internal moisture. When it has been put in stack without having been too much washed by rain and without too much external moisture, the 31 per cent of internal moisture will develop gentle heat and the 'unorganised' ferments in it (*diastose and the like*) will gradually change its nature much in the same way as grain is changed into process of malting and this way the albuminoids and carbo-hydrates, which constitute the greater part of the feeding value in it, are preserved and saved. But when the grass is put together in a silo with its 85 per cent, or so of internal water the unorganised ferments cannot act, any more that they could if a steeping of malt were left in the wet and fermentation of quite a different nature sets in. The moister parts of the silage usually undergo four distinct stages of fermentation each a step nearer to rottenness. The first is a ferment analogous to that in yeast and this gives rise to the characteristic odours of aldihyde fusel oil and various ethyls, substances of much the same nature as those that give the fragrance to whiskey. But in the moister portions 'acetous' fermentation sets in, and it is this that adds the sourish smell to those already alluded to. The 'acetous' is soon followed by the 'butyric' fermentation, and this gives rise to that very powerful odour that is not pleasant to most people. And at this stage come in the *microbes* alluded to in former letters, and which have undoubtedly the power of living in animal bodies in which they may find lodgment, and which, as a matter of fact, do exist in the intestines of silage-fed animals, and which further investigation will probably find also in the milk from such animals. If the silage is badly managed it undergoes 'mucous' fermentation, when the smells become a very powerful stink. Now, all these changes are taking place chiefly at the expense of the albuminoids, and the feeding value is being wasted. But not alone is that the case with these animal forms of the *microbe*. In the drier parts, where atmospheric pressure forces the air, common mould (*aspergillis glaucus*) and its congeners are actively at work in the silo, destroying feeding value, and I may perhaps best illustrate what is taking place by a matter of everyday observation. If a piece of moist skin is thrown down, its smell will speedily tell that animal organisms are breaking up its structures and setting free ammonia, &c. If the skin had been previously dried or tanned, various moulds would be the prelude to its rottenness, and though less apparent to the sense of smell the ammonia would be escaping all the same. So is it in the silo both animal and vegetable organisms are dissipating and wasting feeding value, and in this way alone for the black liquids that drain away at ... waste both nitrogen and carbo-hydrates and the loss of feeding value originally in the grass may run from 20 to 75 per cent according to the way in which the silo is managed. I have called the attention of your readers to this because it is a matter invariably shirked by the enthusiast in silage ; and if you readers fully grasp these facts they may possibly conclude the old style of fodder preserving is not on its last legs yet. Before proceeding to deal with the cost of the different methods, I may make a few observations on the letters of your later correspondents 'A' and 'B.' The first contains much common sense, and their is nothing in it that calls for criticism except that—as I hope to show—he puts the cost of silage too low. 'B's,' letter shows much ability, but, from the 'Old Style' point of view, rather wrongly directed. Why did he withdraw two of Dr. A. J. Voelcker's tables ? If any should be ruled out it is those dealing with green cut silage on account of extravagant cost ! He did not put the quantity of meals given quite clearly. It was 8lbs. each of maize and oil cake, or 6 lbs. per day for each animal, and from Lawes, Woolf and many other experimenters we know, the daily growths, ... were less then should have resulted had the silage been omitted. But nothing, definite or satisfactory can be learnt by using silage along with large quantities of other fodders. It is a perfectly well-known fact that distillery wash when used along with hay, meals, maize, or other sound dry fodders, fatten cattle rapidly for a time, just as sheep infected with liver fluke fatten for a time, but the cumulative growth of the *microbes* introduced by the distillery wash ultimately bring rot, and it has yet to be proved that ensilage that has reached the 'butyric' stage of fermentation will not have the same effects. 'B,' having left out tables that did not suit him, next quarrels with Dr. A. J. Voelcker's chemistry, and sets up *one grotesque* of his own, which I presume, he wished me to knock down for him ; but it is really so shaky in its legs, unless he holds it up—which might be dangerous—I'm afraid I cannot have that pleasure. He asks, ' Are we correctly informed that silage contains 75 per cent moisture ?' That depends upon circumstances. Your readers know water has a habit of trickling down and the top of a silo may have silage in it of 40 to 50 per cent moisture. Dr. A. J. Voelcker could only deal with the quality used, and no doubt his figures would be quite correct. And 'B,' having founded his tables on an imaginary basis of 75 per cent, finds the whole structure topple over with a rush ! He also goes astray in the weight of grass per acre An average crop of grass (Warrington), at leading for hay, is 2 tons per acre, and from the data given before as to moisture, the fresh grass will weigh a little over 10 tons per acre when cut. On these figures, his contrast between silage and turnips will be egregiously wrong ; for with 10 tons grass 85 per cent. moisture, we have 3,360 lbs. of solids, instead of the 6,720 lbs. he gives. But the shrinkage does not end here, as will be apparent from what has been shown to take place in the silo. Even in the best made silage the feeding value to more than 20 per cent of what was originally in the grass, has been lost ; but taking 20 per cent as the loss, the figures giving the equivalent of 3,360 will be 2,688 lbs., against the 4,480lbs. he gives as the solids in a crop of turnips 20 tons per acre. But that method gives a very inadequate idea of values. In the agreed tables of the feeding value of the ordinary fodders, hay stands at 100 to 600 of swedes for cattle, and as 100 to 400 for sheep. Thus for cattle the ratio is 1 to 6. which, in tons, is 2 to 12, or, for hay 2/2 equal 1, and for turnips 12/20 equal 1·66 for 2 tons per acre is the weight of hay, and 20 tons that of the turnips be quoted. But the silage has lost 20 per cent of its feeding value in the silo, thus 1—·20 equal 80 as against 1·66, that is, the silage is just half the value of the turnips at these quantities per acre. These figures relate to feeding value, and not to the relative cost of silage and turnips, which cannot be dealt with until further questions are settled. To get at something definite as to the real cost of making hay and ensilage, a few indisputable or generally accepted propositions will have to be laid down, and I may here say that I am myself astonished at the great disparity that a careful examination shows to exist.

1. A man's labour at 3s. 9d. per day of 10 hours equal 4½d. per hour. A woman's at 2s. 6d. equal 3d. per hour.
2. Horse power (Cameron) costs 4½d. per hour.
3. One man, 2 horses and machine will cut 5 acres of grass in 10 hours, cost 11s. 3d.
4. Two men, 2 horses and machines will throw out, turn, and rake up grass on 5 acres in 7½ hours, cost 11s. 3d.
5. Three men will put up hay in three hours, cost 3s. 4½d.
6. If weather is bad, 4 men, 2 women will throw out, turn rake, and put up again in 5 hours, cost 10s. or 2s. per acre
7. Average crop is 2 tons per acre and 84 stones is 1 load, therefore, 5 acres equal 25 loads hay.
8. If stack is near to field, 4 men, 2 women, and 3 horses and carts will stack, lead, and clear up field in 8½ hours, cost 26s 6d.
9. If field is one mile distant, to and fro is 25 loads, will be 50 miles, and 3 horses moving 2½ miles per hour will take up 6⅔ hours, and as the whole staff is delayed, cost will be 20s. 8d. or 4s. 1½d. per acre.
10. Form data given above weight of grass is 5 times that of hay, but as 100 stones wet grass make 1 load, cost of leading silage is 3 times that of leading hay.
11. The cost of silo for 5 acres will be, say, £45, and 7 per cent interest for redemption, equal £3 3s.
12. The value of 5 acres of grass is, say £35, and loss on outside silo is, say, 5 per cent, equal £1 15s.
13. The loss of feeding value on remainder, in the way mentioned previously will, at least, average 20 per cent, or £6 15s.

Interest on the machinery used in making hay and silage should be charged, but as they are used for other purposes, and for larger quantities than the 5 acres here dealt with, the interest is omitted. With these propositions agreed to, we can definitely fix the cost of hay and silage.

Hay—Cost of making 5 acres:—

			£	s.	d.
3.	Cutting	... ...	£0	11	3
4.	Making	... ...	0	11	3
5.	Putting up	... ...	0	3	4½
8.	Leading and stacking	... ...	1	6	6
	Thatching and finishing	... ...	0	12	4½
		5 ÷	£3	4	9
	Cost of making hay per acre	...	£0	12	11
6.	If weather is bad additional	...	0	2	0
9.	If to lead one mile	... ...	0	4	1½
	Outside cost of making hay		£0	19	0½

Silage.—Cost of making 5 acres :—

			£	s.	d.
3.	Cutting	... ...	£0	11	3
10.	Leading, 26s 6d × 3	... ...	3	19	6
11.	Interest on silo	... ...	3	3	0
12.	Waste outside silo	... ...	1	15	0
13.	Loss of feeding value	... ...	6	15	0
	Extra labour waiting &c.	... ...	1	10	0
		5 ÷	£17	13	9
	Cost of making silage per acre	...	£3	10	9
9.	If to lead one mile 4s 1½d × 3 =	...	0	12	4½
	Outside cost of making silage	...	£4	2	1½

From these figures it will be seen that, without putting a strained value upon any point, silage costs for making about four times as much as does hay. If we add 35s. per acre to each for rent and taxes, and 25s. per acre for manures, we have £3 19s. for 2 tons of hay = £1 16s. 6d. per ton and £7 2s. for the nominal 10 tons of ensilage, or 14s. 2d. per ton. The quantity that would weigh out would probably be less than 8 tons, but this is taken into the account in (15s.) loss of feeding value. Now, the practical outcome of these figures is that the man who makes grass into silage instead of into hay absolutely wastes £3 3s. per acre of his money. No doubt efforts will be made to whittle down some of these figures, but so far as is known to me nothing can be done to put a different complexion upon it than is here given. No doubt, as a matter of convenience, it may be of use to have a little silage, but it should in all cases be salted, as was done, to my own knowledge, forty years ago; but that ensilage will ever supersede the making of hay or the growing of turnips is the veriest nonsense that ever entered into the mind of man to conceive—I am, &c., OLD STYLE,—*North British Agriculturist.*

GERMAN SUGAR BOUNTY.

THE immediate effect of the sugar bounty in Germany was to vastly stimulate the export trade. In 1876 the export amounted to no more than 500,000 cwts. But in 1885 more than 6,000,000 cwts. were exported, *i e*, more than half the total product of beet sugar in Germany. In 1884 the German tax-payers paid out about £1,000,000 for bounties on this sugar. In 1885 the amount probably was £12,000,000, which represents so much money thrown away by them. Or, rather, the money was given away—given away to the foreign consumers of the exported sugar, who got it for less than the cost of making. These consumers were very largely English; but the bounty sugar has been sent to all parts of the world. Last year no inconsiderable quantity made its way to the United States. More sugar was at length, poured out than the world could absorb, even at the reduced price which the bounty made possible. The dividends of sugar factories, which had averaged more than 8 per cent in the years 1881 83, fell to 3½ per cent in 1884; while the balance last year was probably a negative one. At present the sugar industry is suffering under the severest depression. Germany has on her hands a large investment of capital and a large aggregation of labour in an industry dependent for continuance on its present scale, on the bounty. To stop the bounty would mean great loss to the sugar-makers and great suffering to their employees. Yet its continuance means an unsufferable waste of money by the German people—a waste more obvious than is generally the case with protective taxes, because it comes in the shape of direct money payments out of the treasury. One or two feeble attempts have been made to devise a remedy, but nothing has been done, and matters remain in the same perplexing state. But the most remarkable result of the German bounty has been its imitation by France. It is not very strange that Austria should have the same fiscal system as Germany, and should have got the same sort of results from it. But France had taxed her sugar in a different way, taxing the sugar and not the beets, that had been free from these bounty complications. Indeed, she had given up in 1881 a bounty which had resulted from an excessive drawback under the tax system then in force. But the development of the German sugar industry, and more particularly the importation into France of German sugar, was more than the patriotic spirit of the Frenchmen could bear. In their jealousy of their neighbours, they were determined not to be outdone in the sugar fight. So in 1884 they not only put a duty on the import of sugar, which was aimed at keeping out the German product; they also adopted the German system of taxing the raw beets, clapped on an excessive drawback and entered the field as competitors in selling sugar to the world at large at less than cost. Their net-bounty has been calculated to be 11½ francs for the metric cwt. for this year, when it first becomes effective—that is, it is nearly three times as large as the German bounty. It will be curious to see how long this sorry struggle lasts, and what results will follow from so wasteful a a misdirection of industry.—*Englishman.*

VARIATION IN PLANTS.

IN spite of the assertion by De Candolle and other authors, that "a cultivated species varies chiefly in those parts for which it is cultivated" we find great degrees of variation affecting different organs and often extending to other parts of the plant structure. This statement applies both to plants in a wild state and to those under the care of man, when in the latter case the conditions may be considered more or less artificial. The reasons for this similarity of variation, both in a wild and cultivated state will be obvious when we consider that a plant must originally vary spontaneously, before man can in any way affect it, at least by selection. This is especially the case where we have obtained by selection in the course of many generations a number of distinct races, descendants of one species as in the apple, pear, chrysanthemum, and others. It simply comes to this that man cannot so far alter the conditions, as to cause plants to abandon their natural tendencies nor to vary except in accordance with natural laws. Therefore spite of the fact that man desires to select seedlings presenting the requisite variation in one organ or set of organs only, it very frequently happens that there is a correlation between the homologous parts of plants causing them all to vary more or less evidently in a similar manner. Cases of albinism will serve to illustrate this point.

Plants producing red, pink, purple, yellow, or even blue flowers normally often both in a wild or cultivated state, give birth to seedlings with pure white flowers. Some authors would describe this as a case of reversion. The converse more rarely happens, but lychnis vespertina, sometimes producing red flowers, and primulas belonging to different species, are cases in point, both in a state of Nature and under cultivation In connection with albinos amongst plants, not only are the flowers white, but the foliage and the whole aspect of the plant bears and unmistakeably pallid hue, and such plants can often be recognised in the absence of flowers. This paleness in the colour of the foliage does not owe its existence to man's selection, but is more often an undesirable feature than otherwise. This correlation of homologous parts is exemplified in white flowered varities of lychnis chalcedonica, L. diurna, silene armeria, linaria cymbalaria, campanula rotundifolia, thymus serpyllum, and dianthus deltides. The same may be said of impatiens flaccida, which has dark foliage and stems more or less striped with purple, but in the white flowered variety has pale foliage and pale green unstriped stems. White flowered varieties of primula sinensis have pale foliage, and dark flowered forms are characterised by foliage of a similar tint more especially evident in the petioles, the midrib, principal nerves, and the under side of the leaf generally. There is also a correlation between the colours of the under side of the leaf and that of the flowers in senecio cruentus and other species.

The tuberous roots of the dahlia afford another striking instance of the variability of plants even in the parts that are not specially selected either for the benefit or pleasure of man. Some have large, or even short, thick and very succulent tubers, while in other cases the individual tubers are elongated and spindle shaped or long, slender, gradually tapering to a point, and radiating or projecting in all directions. Nor is this variation confined to form, but in a collection of any extent, considerable variety of colouring is found to prevail, such as yellow, white and purple, or violet This is frequently unnoticed because of no interest to the general cultivator, nor presenting anything valuable either for economical or ornamental purposes. There is also a more or less evident correlation between these colours and that of the flowers. Uncared for and generally unimporatant though frequent and considerable variation extends to the foliage stems, and flowers of different individuals.

What applies to the *Dahlia applies still more forcibly* to the potato, notwithstanding the fact that the tubers form the only part specially selected. This is the more remarkable, considering the number of varieties in cultivation at an early period of their history even in this country. In the northern parts of Britain, before the ravages of the potato murrain became so severe, numerous favourite and valuable sorts enjoyed an extensive cultivation, ranging over wide districts. Now these sorts were so distinct both in the subterranean and aerial parts, that any one possessed to an ordinary degree of the faculties of observation, could tell to a nicety by the stems and leaves alone what particular variety would be found on digging up the plant. Of the twelve to eighteen varieties coming under my observation, and mostly cultivated in the field, I could readily distinguish at sight all, except those which were mere sports from other varieties, differing in the stripes, flakes or markings of the tubers, but having stems and foliage perfectly similar. This fact amply testifies to the amount of variation in the aerial parts of potatos, notwithstanding that they have have not been selected on that account, nor particularly desired for such. Between the stems and tubers there was generally a more or less pronounced correlation in colour. This is the less remarkable when

we consider that stems and tubers in this instance consist of homologous parts, modified to perform each their own particular functions. Excepting chlorophyll, or the green colouring matter of plants, the other colours are much less effected by light or its absence, so that the relation between stems and tubers of potatoes becomes more apparent, rendering their correlative variation a matter of common and expected occurrence In striking contrast to the deep purple, almost black, tubers and purplish stems of some varieties may be mentioned their white flowers, while other sorts with white tubers have pink or purple flowers.—J. F. *in Gardeners' Chronicle.*

LAND PLASTER—ITS USE AND VALUE AS A FERTILIZER.

LAND PLASTER, or Gypsum, is a sulphate of lime, which is a combination of lime with sulphuric acid and water, in the proportion of twenty-eight of lime, forty of acid and eighteen of water. It is found in large quantities in Nova Scotia, whence it is brought to this country as ballast for vessels. There is also a black or dark coloured plaster, found principally in New York, and known as "Cayuga Plaster," from the county of that name, in which are the principal deposits. There are other large deposits in different parts of America and in Europe, but the terms "Cayuga" and "Nova Scotia," serve to distinguish the two leading varieties, the former being black, while the latter is white, and, if unadulterated, one is doubtless as good a fertilizer as the other. Each brand has its champions, and each vendor pushes its claims to superiority; but the farmer should be governed by the guarantee of purity, and the price at which the desired article can be obtained in his market.

Owing to its great abundance and ease of preparation, plaster is the cheapest of all our commercial fretilizers. Yet it is the least used, owing, in part, I think, to its merits being improperly understood, and to the strong claims of manufacturers and vendors of phosphates, on which there is a greater margin of profit. In my own farming operations I use more or less plaster every year, and have witnessed some of the most marvelous results from it. My farm consists of three different varieties or formations of soil—a coal slate, a sand stone gravel, and a stiff, heavy clay, and while barnyard manure and phosphate always gave the best results on the clay and gravel, I could see no perceptible difference with the plaster, that always paid me and doubly so in a dry season, which I attribute to its great activity as an absorbent of water and ammonia. For corn I have used plaster, both in the hill and on top, when the corn was up. The former I cannot indiscriminately recommend, having had trouble with a field treated in this way once, on account of the weather turning cold and wet for a week or ten days immediately after planting. The corn failed to come up right, and an examination showed that all the seed covered with plaster was rotten, while scattering grains that had missed the plaster were all right. I have, however, observed that corn plastered in the hill came up sooner in dry, warm weather than corn not so treated.

But after the above experience I discontinued its use in the hill, the risk of rotting being greater than I cared to take, and adopted the plan of putting it on the top about the time the corn should be all up, and as it was always put on by hand, it gave an excellent opportunity of seeing every hill, when missing ones were replaced, and those obstructed by clods or stones were relieved, thus securing an even stand, which is so desirable to every farmer who takes pride in his business. The amount used per acre was about one hundred pounds, which experience had shown produced as good results (on my soil) as a larger quantity when used in the hill; but I have no doubt a much larger quantity, sowed broadcast and cultivated into the soil in connection with that used in the hill, would often be a paying investment. I have also used considerable plaster on potatoes, both in the hill and after the potatoes came up, but could never see the effects so plain as on corn, where the rank green foliage—completely hiding the ground and bidding defiance to the drought—stood in marked contrast to the stunted, scorched appearance of the test rows not so treated.

I have never used plaster much on the small grains, but one experiment with rye, a few years ago, proved so satisfactory that I will give it for the benefit of my readers. The ground where the experiment was tried included about six acres on top of a knoll which, owing to its high elevation and consequent heavy grade, never received its quota of barnyard manure. It had orginally been good land, but hard cropping and several severe washings when cultivated in corn, had reduced its fertility until it became a very difficult matter to get grass to catch on it. After repeated efforts without success, I resolved to try a new plan. My stock-in trade consisted of a few bushels of dry hen manure, half a ton or so of plaster, and a big giant corn or cob mill. I mixed the hen manure and plaster in the proportion of three bushels of the former to one of the latter, and ran it through the corn mill, which left it in splendid condition for drilling. I drilled in this mixture along with the rye at the rate of about five bushels per acre, until it ran out at the end of the fourth acre. I then left a strip of perhaps half an acre without any fertilizer, after which I drilled in plaster alone, at the rate of two hundred pounds per acre, on the balance of the plot. I might say I drilled in, at the same time, four quarts of timothy and four quarts of red clover seed per acre. The result was a good crop of rye—except on the unmanured strip—over the whole plot, with a noticeable difference in favour of the hen manure. The rye on the unmanured strip was short, thin and poorly filled. But it was on the grass crop where the contrast showed to the best advantage. The clover and timothy caught nicely and grew luxuriantly, both on the plastered lot and where the hen manure was used, with perhaps, a little the best show of timothy on the latter. But the unmanured strip had no grass at all, and looked, from a distance, like a strip of ploughing which finally covered over with mulleins and sorrel, and was plainly discernible on the corn crop which followed a few years after.

It is on clover that plaster makes its greatest show. Indeed it seems to be a specific. I have seen the application of one hundred pounds per acre, sowed broadcast during a dry spell, make all the difference between a poor crop and a good one. The farmer who can raise an abundance of clever has but little need to buy phosphates, as a crop of clover that will cut three tons of hay per acre at two cuttings may, if ploughed under or cut and fed to stock, and the manure, both solid and liquid, carefully saved and returned, add to the soil as much available nitrogen, phosphoric acid and potash as is contained in forty dollars worth of bone phosphate. This being the fact, is it not all important to cater to its wants and if possible, make two stalks grow where but one grew before of this golden plant, that has been appropriately termed "the sheet anchor of American agriculture?" And if two hundred pounds of plaster per acre, costing 1·50, will bring about these results, what cheaper mode of increasing the fertility of our soils can we adopt? I have heard a great many theorists speculating as to the proper time of applying plaster. Some say at seeding time: others, that after the seed-plant is up is the right time, while still others say it should be sowed on clover in the early morning while the dew is on. My observations teach me that the first two are right, while the third is entirely dogmatical.

The first and important thing to do is, to get your clever to catch, and that this can be doubly assured by an application of plaster at seeding time, my own experience abundantly proves. Indeed I have seen the plastered corn hills plainly discernible two years after the removal of the crop, the ground having been ploughed and seeded to oats and clover in the meantime. But if the young clover plant is threatened with a drought, by all means treat it to a top-dressing of plaster; it will repay you many times over, for it is a fact, that the greatest benefits from plaster are derived in a dry season, which I consider one of the strongest points in its favour. Everybody knows it is no trouble to raise crops if we are favoured with plenty of warm showers they boom right along, and the farmers' barns and bins are filled to overflowing. But it is when dire drought is scorching the life out of plant and bud, and every green thing is withering and crying for rain, that "the best laid plants o'mice and men" come to naught. It is here that plaster shows its supremacy and a liberal application of it made at the right time would, without doubt, often avert what would otherwise prove a calamity.

There seems to be an opinion prevalent with many that as plaster or sulphate of lime does not enter largely into the composition of plants, it can be of but little use as a fertilizer. They do not consider that there are substances which, while they do not contribute directly to the growth of plants, have chemical or mechanical properties that play a very important part in vegetation. Plaster has both of these properties. As a disinfectent and deodorizer it is one of the best, as well as cheapest, substances at our command. Any one who has kept stock of any kind stabled during the warm summer months, knows what a hard task it is to keep their apartments clean and odourless. Now, if they will keep a barrel of fresh-ground plaster in a convenient corner, and every day, on sweeping the floor clean, sprinkle it freely with the plaster, it will absorb all disagreeable, noxious odours, rendering the air sweet and pure, while the value of the manure will be greatly enhanced by the retention of the ammonia. Poultry houses should also be swept clean at least twice a week in summer, and once a week in winter and the floors sprinkled with plaster; it will add greatly to the value of the manure. and the satisfaction of having clean, sweet, odourless crops and healthy flocks, will abundantly pay expenses. Try it and be convinced. I have practised it for many years with great satisfaction.

A neighbour feeds all his cattle (except milch cows and calves), during the winter season in a large enclosed shed attached to, or rather under, his barn. This shed is bordered on one side by a row of stables, out of which the manure is thrown daily into the shed, where it is trampled by the cattle into a hard, compact mass, and where it receives no water except what is voided by the animal For several years he has made a practice of turning this manure about the middle of March, and mixing in At the same time two or three tons of plaster. The result is, that by corn-planting time, or or say six weeks after turning, his manure is in the best mechanical condition for use, being so well rotted, you can almost penetrate it to the bottom with a shovel, although three to four feet deep.

The truth is, farmers don't experiment enough. They are inclined to take a great many things for granted that are far from being true. Rule of thumb work is too much followed. If the farmer can secure as much nitrogen (ammonia), phosphoric acid and potash in one acre of clover by an application of two hundred pounds of plaster, costing, say $1 50, as he can buy in phosphate for forty dollars, he ought to know it, and the way to find out what this or that particular soil wants is to ask it, questions in the way of experiments.

It may not be generally known that in the process of manufacturing superphosphate from bone with sulphuric acid, there is about six hundred pounds of sulphate of lime—common land plaster—produced in the combination to each ton of phosphate made. This sulphate of lime is taken no account of in setting the price on the phospate, while it may be one of the most important agents in pro-

ducing results for the farmer; but as he does not know he is using it he gives it no credit. This being the fact, I would say to every farmer who is buying, or intends buying, artificial fertilizers: Give plaster a thorough and intelligent trial; then, if better results are wanted, try something else. MILES WALL.

—*American Aagriculturist*, for January 1887.

THE A B C OF AGRICULTURE.

I

Nearly every man, whatever the career into which circumstances may have led him, entertains the hope that, at some future time he may leave his present occupation and return to the country to enjoy a well-earned leisure and rest in a rural life of some kind, whether it be as farmer, gardener, fruit grower, or some other agricultural pursuit. This desire is very general, and quite as general is the notion that such a life is one of leisure and rest and that whatever has been one's previous career and training, farming, or other rural pursuit, is one that he may take up without previous preparation and prosecute it with success.

There is no greater popular error than the very general belief that any one can carry on a farm. One who has been a merchant all his life brings a few qualifications that will be of use in farm life, *viz.*, system in doing business, taking everything in its regular order, and an accuracy in keeping a strict account of every outlay as well as of every income, matters in which the majority of farmers are strangely lacking, and while these are of great importance, they will not of themselves, make a farmer. It is safe to say that, of those who take up any agricultural pursuit late in life, the majority, if they do not make an absolute failure, find it a life of annoyances and disappointments, and that, instead of rest and leisure, they have found countless cares, for which their previous career has given no preparation. Would we discourage those who, in mature years would adopt some form of agriculture for the remainder of their lives? Assuredly not, for it is to aid such that this "A B C of Agriculture" is proposed, not more to point out what should be done, than to show what should be avoided.

"With what did you manure that field?" was asked of a young farmer by one who noticed a most promising crop. "With brains, sir!" was the reply, meaning that he had given thought to the crop and treated it accordingly. Nowhere are "brains" more needed than on the farm. By this we mean, the practice of devoting careful thought to every operation before it is undertaken.

We are very frequently asked by letter, the writer having decided to adopt a rural life, where he had better locate, the probable price of lands, etc. Such a letter shows that the writer had not given proper thought to his project. Agriculture is sub-divided into many different divisions, and before the questions of locality and land, he should first decide what branch of agriculture he will follow. Does he intend to carry on mixed husbandry, or will he direct his energies to the dairy and sell his products as butter and cheese? Will he sell beef, mutton and wool, or shall his finished crops be hay, wheat or barley, potatoes or cabbage, or the products of his orchards? These points must be thought over and decided before any question of location need be considered. When one has decided what he will sell, then the question of markets and means of reaching them will influence the choice of location. These preliminaries all require careful thought, and it is only after these are decided need such questions as character of soil, etc., be taken up, as well as the climatic features of the different localities. It will be seen that careful thought—the proper use of brains—is demanded at the very outset of those who contemplate a rural life, and will be required in all subsequent details. Aside from the important practical matters here hinted at, agriculture, in all its forms, suggests thoughts of a higher orde.. What is agriculture, and what is it trying to accomplish?

Rightly considered, agriculture is something more than the mere raising of crops. It lies at the very foundation of civilization. In the natural condition of things, the savage finds, in the Northern climates at least, very little vegetable food. He lives almost exclusively upon the flesh of animals. These animals collect the sparse vegetable food and concentrate it for the use of the savages who live by the chase, and it is estimated that a single savage requires several square miles for his subsistence. Civilization is not possible without a denser population than this state of things allows: there must be an increased food supply, and agriculture comes in to provide it. Plants in their wild, natural conditions grow much crowded together; upon a given area, the seeds of many different kinds are sown by natural means, and plants are more numerous, and more occupy the area than that can support. There comes, in consequence of this crowded state, a conflict, the stronger crowd the weaker and strangle them. There results what has been termed "the struggle for existence," in which the stronger stifle and kill the weaker. This conflict occurs not only with plants of different kinds, but with plants of the same kind, and those which survive do not reach a proper development. In this state of affairs, the first step with agriculture is to give a desired plant undisputed possession of the soil, by clearing off all the natural vegetation and sowing the seeds of the plant desired. But if the seeds of this plant are sowed too abundantly, the case is as bad as before, for the plant must struggle with its own kind instead of other kinds, and thus fail of proper development. Hence agriculture must give the plants not only freedom from being crowded by other plants, but from crowding by those of its own kind. Much is accomplished by sowing the seeds thinly, and more by removing the young plants soon after they appear, so that each individual may have sufficient room in which to develop. Why some plants are preferred to others, and how they are made so, may be considered in a future article.—*American Agriculturist, January* 1887.

THE LATE MR. H. M JENKINS.

By the death, which occurred on Friday, of Mr. Henry Michael Jenkins, Secretary to the Royal Agricultural Society of England and Fellow of the Geological Society British Agriculture, has lost one of its ablest most accomplished exponents. The sad news must have reached many with surprise as well as very deep regret. He has not seen long off life's bustling scene, and indeed, his illness—of a pulmonary order—had only assumed serious form a few days before the fatal issue. For many years Mr. Jenkins has suffered, especially at this period of the year, from bronchial affection, but he maintained his general health and spirits wonderfully well, and managed to attend to his principal duties even though ailing somewhat.

It is now nearly eighteen years since deceased was transferred from a post of trust in the office of the Geological Society, London, to the secretaryship of the foremost Agricultural Society in the kingdom—the "Royal" of England. The latter post in conjunction with the editorship of the Society's journal—a bulky volume issued twice a year—he held with marked distinction till his death. Mr. Jenkins was admittedly, a prince of secretaries, and during his reign, even in the face of agricultural depression the membership of the Society has considerably increased. As a business man he had few equals. His official notes were marvels, both in respect of penmanship and composition, while the accuracy with which, under his supervision, the proceedings of the Council of the 'Royal' have for many years been reported, has been remarkable.

Deceased, it was soon discovered, was something more than a mere secretary. Possessed of an intimate knowledge of the sciences bearing on agriculture, he did not require much to make himself acquainted with all that was necessary for him to know of the practical side of the great farming question. And what he did require, he obtained with the greatest ease; and applied with judicious caution. His papers in the *Journal* of the Society—and few, if any, issues passed without something from his pen—largely on foreign agriculture and on dairying both, at home and abroad, were very instructive. In dairy matters especially, even in practical quarters, he was looked upon as an authority.

In the matter of agricultural education he took an active part, and contributed not a little to the elucidation of the subject, both by tongue and pen. As a member of the Commission for the advancement of Technical Education, only the other year he rendered yeoman service. Before various Commissions on agricultural subjects, Mr Jenkins gave valuable evidence. He was one of the assistant Commissioners, having a Continental beat, so to speak, to the Royal Agricultural Commission, presided over the other year so ably by the Duke of Richmond and Gordon: and he has contributed much both through the journals of the Society with which he was more intimately connected, and otherwise of considerable interest to the agricultural student, and farmers willing to read and learn. His writings, together with the methodical manner in which he discharged his duties connected with the Royal Agricultural Society, will not be readily forgotten. Few could draft a minute of a meeting so concisely and speedily as he could have done, either writing or dictating.

As a scholar he had not, connected with agriculture, very many equals. With foreign languages, so troublesome to many of Britain's best agriculturists, he was perfectly familiar and this accomplishment no doubt proved of great service to him in his frequent tours through Continental farming districts with the results and observations of which readers of the Royal Agricultural Society of England's *Journal* from time to time had ample opportunity of becoming familiar.

Deceased leaves a widow and large family, only partially grown up to mourn what must be to them an irreparable loss; while thousands of personal friends and acquaintances, at home and abroad, will lament the departure thus early in the prime of life—of one whom they had only to know to like and admire.

NEW THEORY ON WIND BREAK PLANTING.

It may be of interest to some orchard growers to know some benefits to be derived from wind breaks and where to plant or locate them. It depends on what you are planting for; whether for raising the temperature or to keep from blowing off apples, which are the two principal reasons sought after. It has always been the habit of the planter to put the wind break on the north and west, thinking he would make it warmer and make a more even temperature, (the old plan of our fathers which I have great respect for.) Such is not the case. I shall illustrate facts as we find them. It is now conceded that the most desirable location for orchard site is a north slope or hillside which is my experience, and hundreds of farmers are coming to the same conclusion. Many orchards through central Illinois have died out badly, and are now doing so, that have heavy timber belts on the west and north. Now, why is this the case? How can it be possible that our fathers erred,

Well, I shall answer that in our father's day we did not have the extreme rigid low temperature thirty or forty years ago, we have now, hence the necessity of a change in base for making it warmer, if you will allow. Many may think this strange doctrine; yet it will bear weighing and studying for we are sadly in need of light just now to keep our orchards from dying from winter killing. Where shall we plant? Plant your wind break on the south and on the east. Well, but some and many at first thought, would say, that man must be cranky. Well it may seem to those that have never given it any thought, yet my thirty years' experience as an orchardist has taught me many new facts, and some I have learned from dear experience: and any orchard man of any considerable experience will agree with me in this that when we have late spring frosts the more exposed part of the orchard when the wind blows hardest is where it is least affected by the frost. Now to further put this in shape for all to see it. It is a known fact that on bottom lands along our rivers and smaller streams, orchards will not do any good. Now there is a reason for this. The reason is this if the trees could withstand the cold, the blossom or young fruit will get caught with the frost. Now the great reason of the whole thing is this when you stop the current of atmosphere you form to a large extent a vacuum for an attraction of cold to settle down into the valley, or in other words, the atmosphere runs in currents like water. And if you plant a wind break on the north and west and the wind is blowing from the north-west you put an obstruction, which when it strikes it, causes the current to rise and go up. So you see, if you were on the east side, of the break with a thermometer and you have one on the west side they will not register alike, and not many would suppose but will show warmer on the west and colder on the east of a cold dark night. Now another, say as the winds are blowing just moderately when it is just freezing in the day time, the sun comes out bright, the wind break on the west, forming to some extent a vacuum on the east or loss of force, what will be the result? Your trees all along near the break will thaw out during the day and freeze during night time, while if your break had been on the east and south they would have not thawed out at all, because of the exposure to the wind current making it cooler in the day time and warmer in the night time, all done by planting wind break on the east and south.—Mt. Sterling, Ills.—John Shank,—in *Farmers' Review.*

WARM DRINKING WATER FOR MILCH COWS.

In the issue of the *Farmers' Review* of August 11, last, was given some experiments by Prof. Shelton of the Kansas State Agricultural College in giving cows on alternate days warm and cold water, in which though the conditions were not favorable for showing the full influence of warm drink upon milk production, it was shown that upon the day when the cows had the warm water they averaged 8½ per cent more milk than when they drank the cold water, the feed and care in both cases being the same. Those who have kept files of the *Farmers Review* had better stop right here and look up that article and re-read it in connection with the following article from an eastern exchange on the same subject. The experiment of changing from cold to warm drink for cows is one that can be easily made by any farmer and if on making the test he finds there is a real economy in warming the drink of his stock, he will then be fully justified in making his arrangements to supply warm drink to his cows. While the experiments of Prof. Shelton and of the New Jersey farmer were solely with milch cows, and with reference to milk production, there can be no doubt that equally favourable results would be realized from warming the drinking water of animals being fed for beef. The article referred to is as follows:

"The owner of a herd of 25 milch cows in Cinnaminson, Burlington county, N. J., erected a building for his dairy work, in which he placed a common steam boiler, of four horse capacity, to heat water, instead of using the ordinary stove and kettles. From this boiler an iron-pipe was extended to the water trough in the barn yard. It was not completed until last Christmas. Upon turning the steam on, the chill was taken off the drinking water, but it was not raised quite up to the temperature of new milk. The cows would plunge their noses deep into it, take hearty draughts, and go away looking happy.' They did not as in previous cold weather, 'leave the troughs in a humped up condition, shaking their heads,' but really seemed to greatly appreciate the change.

"Now for the result. No variations was made in the kind or amount of food; yet the daily yield of milk jumped up twenty quarts a day the first week, and the higher product continued. The narrator says: 'Thus we see that simply warming the water was equivalent to enough feed to produce twenty quarts of milk a day, which, at the rate the milk sold, yielded a handsome return on the amount of extra investment in the boiler over the common heater." Probably the expense was even less, as steam-boilers are economical of fuel. The winter milk in this case was sold at 8 cents a quart, we think: but at 5 cents it would give $7 extra per week of profit, to say nothing of the better condition of the cows. This result is thoroughly in accord with fully established scientific principles as we have shown. Not only is a considerable amount of food required to produce internal heat, to supply that removed from without, and to warm two or three pailsful of cold water drank daily by each cow; but in domestic animals, as well as in man, ice-cold water taken into the stomach disturbs digestion, and in the case of cows, less of the food will in consequence be converted into milk.

"This lesson is obvious. Let all owners of milch cows try the experiment this season, while it is yet chilly, of giving them their water in lukewarm state, and note the result for future guidance. On such little matters much of the actual profit is realized in farming, as in other pursuits. All that a cow, or a field, yields, above the cost of food, or labour and seed, is profit. Even 3 cents a day on a cow, in increased milk, or saving in feed. is $11 a year, on 25 cows, $273 75."

If there should be an expressed desire for the republication of Prof. Shelton's report of his experiments we will willingly republish it. It goes much more into detail than the above article.—Farmers' Review.

RECORD OF A MODEL DUCK FARM.

There is a huge duck farm near South Easton, Mass., which last year made a record that was commented upon all over the country and attracted much interest. James Rankin is the owner of the enterprise. This year he again gives his yearly record, and the matter is worth reading. He says:

We have got out the present season some 7,000 ducks, chicks and goslings. Over 2,000 ducklings have already gone to market. We have 1,000 of the choicest reserved for breeding purposes, 500 of which are already engaged at prices considerably above their market value. The maximum prices obtained for ducklings were 30 cents per pound; the minimum, 15 cents; the average about 21 cents. Careful estimates and repeated experiments have convinced us that ducks can be put upon the market at a cost to the grower of not over 5 cents per pound. As these ducklings, when carefully fed, are ready for market when nine or ten weeks old, it follows that three months from the time when the machines are filled with eggs, the ducklings are put upon the market at a profit of over 400 per cent on all investments.

We sell principally to large retailing firms, and they have told us repeatedly that our artificially grown ducks are the best fatted and plumpest birds in the Boston market: and they will pay us 2 cents per pound more than they pay for other stock, and that they will not order elsewhere so long as we can supply them, so that in order to sell our ducks, we simply have to remain at home and fill all the orders we can.

We wintered the past season 150 ducks, with the proper complement of drakes. Those ducks commenced laying Jan. 1, and up to the present time have furnished us with 18,460 eggs, or a little more than 123 eggs each. The birds are now moulting, and are giving us about a dozen eggs per day. In October, when they recover plumage they will commence laying, and can be relied on for about thirty eggs each, which will give at least 150 eggs per duck for the season. We will say here that our best hens as egg-producers would have never equalled the record of our ducks, either as winter or summer layers. Our young ducks hatched March 15, commenced laying Aug. 1, and have been laying ever since. We are getting quite a basket of eggs daily from these young ducks. Of the 18,460 eggs above referred to, some four thousand of them we used for purposes of incubation and the rest were sold at remunerative prices for others to hatch. Many of our orders we were quite unable to fill. Many complain of their ducklings through weakness in their legs and inability to stand. This we think is owing to highly concentrated food. The national food of the duck in its wild state is grass and fish of all kinds. This can be supplemented by a grain diet composed of equal parts of good wheat bran, and corn meal with plenty of vegetables of all kinds—potatoes, turnips, beets, cabbage, etc. We fed one bushel of cooked turnips per day throughout the entire winters of 1885 and 1886 mixed with meal, shorts and beef-scraps

Ducks will not thrive on an exclusive grain diet. They are grass feeders, requiring a larger quantity of food than hens, but are not particular as to quality. We grow our young ducks in yards of 10 × 100 feet in extent, putting 100 in each yard. It is absolutely necessary to confine them thus, as they will not only run their flesh off but will greedily eat up all manner of insects which they do not stop to kill, and too often pay the penalty with their lives.

We give water regularly, the same as food, and only sufficient for them to drink. Shade is essential. It is astonishing to see how ducks and apple, pear and plum trees harmonize. The ducks thrive upon the insects, shade and falling leaves, and so enrich the ground that the trees are loaded with large, fair fruit. Our ducklings dress upon an average, five pounds at nine weeks old, so that we usually grow two and sometimes three crops of them on the same land each season. These yards are ploughed up and re-seeded with grass and rye in the fall, the crop, of course, disinfecting the ground, besides furnishing green food for the young ducklings during the early spring. We feed largely during the summer on green corn fodder, which is cut up fine. The young birds do not fatten on it readily, but seem to enjoy it hugely, especially the stock. We are careful not to feed more than the birds will eat clean, and if too much is fed gather up the residuum. Our losses with ducklings have not averaged more than 1 per cent for the last two years and that mostly by accident.—*Ibid.*

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VOL. XII.] CLCUTTA :—SATURDAY, FEBRUARY 19, 1887. [No. 8.

Health, Crop and Weather Report.

Madras.—General prospects good.

Bombay.—Slight rain in the Karachee district. Reaping of *rabi* crops going on in parts of six districts. Standing crops still suffer from blight and frost in some places. Fever in parts of nine, cattle-disease in parts of ten, and small-pox in parts of three districts.

Bengal.—Light showers reported in Eastern Bengal only. All *rabi* crops are promising; the earlier kinds are being harvested with good outturn. Prospects of poppy are generally fair, but the crop is backward in Gya and has suffered some injury in Patna and Hazareebagh from caterpillars. Pressing of sugarcane is in progress, Transplanting of *boro* rice is going on. General health is good, but cholera still prevails in Tipperah.

N.-W. P. and Oudh.—Weather clear and seasonable. Slight injury to crops from frost and blight, otherwise prospects continue to be favourable. Markets well supplied, but prices are rising. Public health good. Cattle-disease continues in a few places.

Punjab—No rain during the week. Health good. Prices stationary in the Hissar, Ferozepore, and Dera Ismal Khan districts fluctuating in the Mooltan district; rising elsewhere. Crop prospects generally good, but rain is much needed.

Central Provinces.—Weather clear and cold. *Rabi* crops are doing well, but linseed has been injured by cold and damp. Prices generally steady.

Burmah—Except a little cholera in Akyab and slight cattle-disease in three districts, the health of Lower Burma is satisfactory. Harvest drawing to a close. Reports received from six districts of Upper Burmah. Some small-pox in neighbourhood of Mandalay. Otherwise public health is satisfactory. Food sufficient and prices moderate

Assam.—Weather cloudy and seasonable. Gathering of mustard almost finished. Outturn good in North Lakimpore. Crushing of sugarcane in progress. Ploughing of land for *ahu* commenced. Prospects of crops good, except, mustard in Sunamganj, which is likely to be a failure. Six deaths from cholera from Katigora and two from Sadr reported, otherwise public health good. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Except in parts of the Tumkur district, where the paddy crop is affected by blight, prospects of season favourable. Public health good, Prices stationary.

Berar and Hyderabad.—Weather clear and cool. *Rabi* crops doing well, prospects good. Reaping of *rabi* crops commenced in Hyderabad. *Tabi* crops prospering. Fever abated to some extent. Prices—steady.

Central India States.—Weather dry and cold. Gram and opium crops affected by frost in Neemuch and Goona. Health and prospects good. Prices steady.

Rajpootana.—Weather very cold but seasonable. Week rainless. Tanks and wells drying in many places. Some damage from frost, principally to opium crops, in Jallawar; gram, *arhar* and others also damaged by frost in most places. *Rabi* prospects fair. Prices of wheat and gram rising in Ajmere. Crops below average in Jeypore. Small-pox continues. Chest affections somewhat prevalent in Kherwara, otherwise public health good. Prices have an upward tendency.

Nepal.—Clear, cold weather.—West winds prevailing and occasionally strong. Prospects fair. Prices high.

Editorial Notes.

We regret very much to record the death of Mr. Krishnaswami Mudaliar, of Shiyali. The Government of Madras, in noticing this sad event, observe that the "persevering and spirited efforts of the deceased gentleman for the improvement of agriculture have, on several occasions, been favourably noticed, and Government consider that by his death the cause of agricultural progress has lost one of its most zealous and persistent advocates." This is a fitting tribute to the memory of a native gentleman, who was always foremost in the matter of agricultural reform.

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The working of the Opium Act and Rules in the Madras Presidency during the past year presents one very satisfactory feature, *viz.*, that while the consumption of the drug has been decreasing, the revenue to Government from this source has been increasing. Thus the consumption decreased from 93,552 lbs. in 1881-82 to 59,814lbs in 1885-86, and the revenue increased from Rs. 4,68,340 to Rs. 7,54,822 during the same period. As in previous years, the monopoly privilege of the retail vend of opium, and of the manufacture and vend of intoxicating drugs, was sold on the farming system in all districts. The supply of opium in all districts was left to private enterprise. Of the farms sold in the several districts, those in Godavari fetched the highest sum, *viz*, Rs. 1,45,150, being an increase of Rs. 69,640 over the figures for the previous year. The presidency imported 506 chests of opium valued at Rs. 3,54,550, Indore supplying the largest quantity.

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Many of our readers will be glad to learn that Mr. Charles Maries, of the Durbhunga *Raj*, has solved the Rhea fibre problem. Mr. Maries has discovered a process by which he can decorticate the fibre in the green state with extraordinary facility, after which he works it up to the required standard under his new process. We have seen some of this fibre, and can state with certainty that we have seldom seen Rhea fibre to equal Mr. Maries specimens. It retains all its strength of tension, while the floss is as soft as silk. Mr. Maries, we understand, has shown his fibre to some of our large Calcutta merchants who deal in fibres, and their opinion is a very favourable one indeed. We congratulate Mr. Maries on his discovery, which ought to prove a perfect "mine of wealth" to him. Any one wishing for further particulars should address himself to Mr. Charles Maries, Durbhunga.

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The sugar industry of India is likely to suffer to a considerable extent in a few years if other foreign markets continue to press their manufactures into our market with as much zeal and pertinacity as the growers of Mauritius have evinced lately. It appears to us to be an extraordinary circumstance that a country like India, the very *home* of the sugarcane, should go outside her own shores for supplies of crystallized sugar. It denotes an utter want of local enterprise in the first instance, and lamentable ignorance of the laws of supply and demand in the second. We understand that in this connection Messrs. Burrows, Thomson, and Mylne, of Beheea, have (or are about to), present a memorandum to Sir Rivers Thompson, dealing with the whole question of the sugar industry of this country, and the part the Government should take in its local development. We are not in a position to publish the terms of this memorandum just yet, but we hope to do so before long.

OUR American cousins always do things on a "tall" scale. Thus we are told that Mr. Parker Earl, the "strawberry king" of Southern Illinois, who grows strawberries by the 80-acre patch, in discussing the strawberry question in the *Rural New Yorker*, says there is no danger of over-production of choice fruit, but that we do suffer from imperfect distribution, though facilities for distribution are improving every year. He expects yet to see a strawberry season of eight months of the twelve, beginning with berries from the gulf coast and ending with those of the British Provinces, and selling so cheap that people will buy and use them freely, and with charges for transportation and distribution so low that they will pay a good profit to the grower. When he commenced growing berries for market 20 years ago five acres in Southern Illinois was more than sufficient for the Chicago market. Now the sales in that market amount to 15,000 tons per year, the product of over 5,000 acres, and other cities, large and small, handle them in the same proportion to their population and location as distributing centres.

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OUR Chicago exchange informs us that in order to test the results of working the southern sugarcane by the diffusion process, 80 tons of cane were shipped from Louisiana to the Fort Scott, Kansas, sugar works, which have been working up sorghum cane by this process, and the following telegram from Professor Wiley, who has been pushing the diffusion process forward, to the Commissioner of Agriculture, gives the result of this experiment :—"We finished boiling 83 tons of Louisiana cane to-night. Made nearly 19,000 pounds of strike. A weighed portion run into centrifugal gave 54 per cent of dried sugar. This will be more than 120 pounds first sugar per ton. Cane juice had 10 per cent of sucrose, 1·8 per cent of glucose, and 14½ per cent of total solids. It would have made only 80 pounds by the old process. We have increased the yield fully 40 pounds per ton. Sugar of fine quality."

This gain therefore of 33⅓ per cent was annually lost in the production of sugar in the past. The diffusion process is a very recent invention, but the centrifugal system of obtaining the crystallized sugar has long been known, and we had an exhibition of it recently at Dumraon. It is possible that in the fulness of time this process will be generally adopted in India.

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A CONTEMPORARY observes that the plan of giving a number of small prizes for horses, ponies and mules at agricultural shows in this country is certainly open to objection, as it affords but little encouragement to any improvement in the different breeds In this we entirely agree. We have pointed out this objection before now, but the Government authorities entrusted with the conduct of such shows seem to think otherwise. A show, we note, is to be held shortly at Erode, in the Madras presidency, where the highest prize offered for any pony is Rs. 50, with several other smaller prizes. Our contemporary observes that during the last Afghan campaign, and in the present operations in Burmah, the Government have found that ponies and mules are much more serviceable than pack-bullocks, but that in many parts of the country the supply is not equal to the demand. It should therefore be as much as possible the object of the Government to encourage the breeding of these useful classes of animals, and this would be more likely to be affected by giving one valuable prize for the best pony or mule at a show, rather than by frittering away the amount awarded in trifling sums.

IT is pretty well understood by farmers that by feeding stock on mixed food, better results are obtained than if they were restricted to one diet. On this subject that valuable journal, the *American Agriculturist* writes :—"There are two cardinal principles in relation to mixed feed ; first, that mixed feeds are better than plain ; second that all the elements of the mixture should be fed each day, instead of one element for one day or one week, and another for another day or week. Thus, for instance, the experiments at Rothamstead, England, showed that eight pounds of peas, or six pounds of oil-cake meal, would make a pound of live weight ; while of peas and oil-cake meal mixed, four and one-half pounds would suffice. It is as an element of mixed feed that roots attain their greatest value. Thus in a great majority of cases, it will be found that a sheep receiving three pounds of bright wheat straw, and six pounds of turnips per day, will increase as much in weight, or keep in as good condition, as another with three pounds of the best timothy hay : while the former will cost less. It has been ascertained that to keep a sheep in good thriving condition, fifteen pounds of perfectly dry feed (of average good quality), is required per week for each one hundred pounds of live weight. But since hay and grain, in their ordinary condition contain about fourteen per cent of water, from eighteen to twenty pounds per week will be necessary, or about three pounds per day. To facilitate digestion and prevent constipation, it would be well if an equivalent of this amount of nutriment could be expanded in bulk, so as to weigh seven or eight pounds."

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SIR EDWARD BUCK, the Secretary to the Government of India in the Revenue and Agricultural Department, has been making a tour in India since his return from England. The tour commenced with the North-West Provinces and extended first to Ajmere, where the resettlement operations have lately been brought to a close. Then he journeyed to Bombay, where the Agricultural Department is commencing to arrange for the maintenance of maps and records in districts released from the Settlement Department ; thence to the Central Provinces, where settlement operations are in active progress under Mr. Fuller —the whole province, or about 50,000 square miles of assessable land, having to come under re-settlement within ten years ; and finally to Madras, in which presidency the survey and settlement operations are likely to be concluded within the same period. Our Allahabad contemporary understands that the main object of Sir E. C. Buck's tour has been to arrange with the various local Governments the best method of village survey and of gradual transfer of settlement operations to the Agricultural Department and its branches, which, under the policy inaugrated by the Famine Commissioners, will maintain village maps and records under a system precluding the necessity of periodical revisions of settlement by special departments.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 9th February 1887 :—With the exception of light showers in Eastern Bengal the week under report has been rainless. The early *rabi* crops continue to be reaped in Bombay and Bengal. Elsewhere the prospects of the standing crops are generally excellent, though some injury has been done to them by frost and blight in parts of Bombay, the North-Western Provinces and Oudh, the Central Provinces—where linseed has been principally affected—Rajpootana and Central India In the Punjab rain is still much needed for the *rabi* in five districts. In Madras the standing crops are generally in good condition, but in parts they have been affected by disease and in some places are withering for want of rain. In Coorg the season promises favourably. The winter rice harvest is over in Bengal, and the spring rice is being transplanted. In Burmah the rice harvest is approaching completion and threshing operations have commenced. The pressing of sugarcane is in progress in Assam, Bengal, the North-Western Provinces and Oudh and the Central Provinces. The gathering of mustard in Assam is almost over. Poppy prospects continue excellent in the North-Western Provinces and Oudh, but are less favourable in Bengal. In Central India and Rajpootana the plant has been affected by frost. The general health of the people continues satisfactory. Prices again show an upward tendency in the North-Western Provinces and Oudh this week, and are still rising in the Punjab and in some States in the Rajpootana Agency. Elsewhere. they remain generally steady.

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WRITING on the subject of mining industries in Burmah, *Indian Engineering* says :—

"Very little progress has been made during the past year in the development of the mineral resources of this province, owing to the disturbed state of the country. There are large workable deposits of coal in the Mergui district, but the country being so thinly populated, unhealthy and some distance from the Tenasserim river, no attempts have as yet been made to work these deposits. In Thayetmyo prospecting for

coal is continued, but as yet no success, has been attained Any way, under present circumstances, the coal could not be brought to Rangoon at such a coast as to compete with that imported. The price of English coal at Rangoon is from Rs. 15 to 18 per ton. Good coal is found in Upper Burmah, but nothing up to the present time has been done to work the deposits. Rich deposits of tin are to be found in the Mergu district, and are from time to time worked by the Chinese, but for some reason or other they do not appear to work it so successfully as in the Native States adjoining, although the Government protect them: during the past few years as much at 10 per cent was taken off in the export duty, and the only conclusion that could be arrived at, by comparison with the success attending the miners in the Native States is, that they are bound down more like slaves; whereas those under the British Government are free to work as they like. Mr. Law, of Moulmein, has obtained a license for prospecting for lead in certain hills in the Salween valley, and another gentleman from the same place has taken out a lic ense to prospect for antimony in the hills within seven mile s from Moulmein. The latter has been so far successful, and has abtained some 80 tons of ore, and forwarded the same for valuation to England."

Mr. J. F. Price, Acting Director of Revenue Settlement and Agriculture, Madras, submitted in August last certain proposals regarding the education and employment of *salutries* (native veterinary practitioners). His idea was that these men should have a practical, rather than a theoretical, training, and he was therefore of opinion that they should be recruited from the ordinary ryot or peon classes, as they, having no education to give them aspirations, will be content to be what they always should remain, *viz., salutries* and nothing more." That having selected the men, they should be placed under experienced cattle diseased inspectors for six months for training; and those who did not qualify should be turned off, this period being considered quite long enough within which to learn all that was necessary. In the matter of pay, he thought Rs 10 per month during the period of probation and Rs. 20 per month as a maximum salary, quite enough; the object in view being not so much to retain them as Government servants as to educate a large number of men in the European method of castration, and then let them return to their own parts of the country and teach others what they have learnt. These recommendations have been sanctioned by the Government of Madras, and operations will, for the present, be confined to the districts of Salem and Coimbatore, because here the experiment in pony-breeding is being carried out. Two paid pupils on Rs. 10 per month will be attached to each instructor, and if the experiment is successful, the number may be increased. In this connection, we gather from the papers before us, that a *salutry* is regarded *only* as castrator. As a matter of fact *salutry* is the term applied to *all native veterinary practitioners*—at any rate it is so understood in upper India. A report of the present tentative operations is to be submitted six months hence, which we shall await with interest.

The uses of plaster are, we believe, very little understood in this country; at any rate we do not remember seeing it ever tried as a manure or as a disinfectant. The following note from an esteemed exchange ought to convince all sceptics as to the value of common plaster:—"There seems to be an opinion prevalent with many that as plaster or sulphate of lime does not enter largely into the composition of plants, it can be of but little use as a fertilizer. They do not consider that there are subtances which, while they do not contribute directly to the growth of plants, have chemical or mechanical properties that play a very important part in vegetation. Plaster has both of these properties As a disinfectant and deodorizer it is one of the best, as well as cheapest substances at our command. Any one who has kept stock of any kind stabled during the warm summer months, knows what a hard task it is to keep their apartments clean and odourless. Now, if they will keep a barrel of fresh-ground plaster in a convenient corner, and every day, on sweeping the floor clean, sprinkle it freely with the plaster, it will absorb all disagreeable, noxious orders, rendering the air sweet and pure, while the value of the manure will be greatly enhanced by the retention of the ammonia. Poultry-houses should also be swept clean at least twice a week in summer, and once a week in winter, and the floors sprinkled with plaster; it will add greatly to the value of the manure, and the satisfaction of having clean, sweet, odourless coops and healthy flocks, will abundantly pay expenses. Try it and be convinced."

The fish-curing operations in the Madras Presidency, which have now been conducted regurlarly for some years past, continue to make good progress. The operations during the half year ending March 31st 1886,show particularly satisfactory results. Thus we are told that during the period under review, 135 yards were open and 133 were worked, as against 140 open and 123 worked in the corresponding half of the proceeding year: the total quantity of fish brought to be cured was 19,559 tons as against 14,484. There was thus, notwithstanding the unfavourable character of the season in some localities, an increase of ten in the number of yards worked and of nearly 32 per cent in the quantity of fish cured. This latter increase was general, and occurred in all but to divisions. The most noticeable feature of the period under review was the remarkable success which attended the working of the yards in the Maugalore circle The transactions in these were hitherto merely nominal, but during the half year they, as compared with the corresponding half of the previous year, increased nearly fourfold. In point of quantity of fish cured, the Calicut division ranked first with 739 maunds, which comprised nearly 71 per cent of the weight produced by the whole of the presidency; next, but far behind, came Tinnevelly with 54 381 maunds, followed by Chicacole with 27,347 maunds. The last in order, was, as might be expected, Chingleput with 11,534 maunds.

The average quantity of salt issued for each maund of fish cured decreased from 13·33lbs. in the half year ending 31st March 1885, to 12·99lbs in the period under report; and the Commissioner states that the variations in the individual yard are rapidly becoming less marked This is satisfactory. The departmental experiments in fish-curing were generally speaking satisfactory and resulted in a small gain to Government nearly in all divisions, and the Government trust that the importance of these operations will not be lost sight of; as they not only serve a very useful purpose by way of example and of an additional stimulus to an industry which has been steadily and rapidly advancing since 1881-82, but they are also of value in assisting to determine what should be the average amount of salt per maund of fish which should be used in curing operations. The financial results show a gain to Government of Rs. 12,420, but taking the total receipts and expenditure from the commencement of the experiments, there was up to the end of the half-year a loss of Rs. 3,310 or 9,833, according as interest on outlay is excluded or included. It is noted, however, that one item of expenditure, *i e* the erection and maintenance of buildings is rapidly being thrown on the fish-curers themselves, and this, it is hoped, will materially tend to diminish the expenditure and enhance the receipts in future years.

The following is Messrs. Gow, Wilson and Stanton's Indian, Ceylon and Java Tea report, dated London, January 21st, 1887:—*Since our last (dated 7th instant) 63 256 packages of* Indian, 5,222 packages of Ceylon, and 2,144 packages of Java, making a total of 70,622 packages, have been offered in public auction. The largest amount of Indian tea ever placed on the market in one fortnight has been catalogued since our last, but the trade, having to a great extent cleared out the cheap purchases made before Christmas, has not feared to buy freely, hence the market for all low leafy grades has advanced fully ½d. to ½d. from lowest quotations, while medium Pekoes show as much as 1d. to 2d. advance. There is an improvement in the quality of recent arrivals, many teas having an autumnal flavour which buyers have fully appreciated Darjeelings were in small supply, and any teas with flavour and quality are eagerly competed for at greatly enhanced prices. The average value of Indian tea, it should not be overlooked, is still exceptionally low, so that satisfactory deliveries may be expected, unless a

substantial rise should occur. As an idea of the current prices of Indian tea in London, we quote :—

Fannings	...	6¼d.	same time last year	8⅜d.	and 7 d. in 1884
Broken Tea	...	7d.	,, ,,	9⅛d.	,, 8¼d.
Pek. Soug.	...	9d.	,, ,,	10⅛d.	,, 9½d
Pekoe.	...	10½d.	,, ,,	1·0¼	,, 11¾d.
Pek. Soug.	...	7d.			
Pekoe	...	8¼d.			

An increasing quantity of Ceylon tea has been placed on the market during the past fortnight, but not more than enough to meet the ever-growing demand ; in fact, Pekoe Souchongs and Souchongs are much wanted, and are difficult to buy, except at higher quotations. The rates for Pekoes remain firm, but Broken Pekoes and Fannings, which grades come more directly into competition with Indian kinds, are rather neglected—unless the liquors are strong and rich. Generally quality is being well maintained ; this is very satisfactory when it is remembered that about this time last year, a deterioration was observable. Of the 2,144 packages of Java in public auction, 1,813 were of direct import, and comprised selections from ten estates. Recent prices have been fully maintained, and the lower grades of fair liquoring whole leaf teas are somewhat firmer ; catalogues for 1,613 packages ex S.S. *Smith* are issued for next week. The 2,144 packages sold at an average of 8½d. per lb.

DUMRAON AGRICULTURAL EXHIBITION, II.

We left off last week at dye plants ; and will now resume our review of the rest of exhibits. In the class for vegetables there were some really creditable specimens. Potatoes, both from country and English seed, were particularly good for this season of the year ; so were the egg apples (*begoon*) : we have seldom seen them better or larger. Among them there was one plate of what we knew some years ago as the 'golden gem' variety, and the fact of this having found its way into Dumraon is evidence that English vegetables are largely cultivated there The cabbages and cauliflowers were fully equal to anything we have seen in Calcutta, white onions, carrots, &c., were also well represented. Among flowers, we noticed some very fine roses, which grow and bloom to perfection in Dumraon, as any one might have seen in the Maharaja's garden. This is not a very good season for fruits, so in this class there was nothing to notice specially. In the textile class there were some specimens of some coarse cloths and blankets,which we did not think of any account. Dumraon is rather backward in this branch of industry. We do not of course include in this the fine exhibits from the Buxar jail, which would do credit to any loom.

The dairy produce class was better represented than we expected. The specimens of *ghee* were such as our Calcutta folks seldom see, and would pay a high price for. Matters were, however, so hurried that a cursory view, such as we had, does not justify us in pronouncing a decided opinion on the dairy produce of the district.

There is one branch of the exhibition to which we wish to direct special attention, *viz*, the agricultural implements class. Here there were four principal exhibitors, Messrs. T.E.Thompson and Co., Jessop and Co., the N.-W. Provinces Agricultural Department, and the Bengal Iron Works Company. The first-named exhibited chiefly English implements, which we did not think would commend themselves to the Indian ryots. In the first place they were too complicated,and in the second the prices were beyond the means of the people. We did not find a single implement that we would ourselves purchase for agricultural purposes in India. Messrs. Jessop and Co. were more fortunate. Their 'Hindoostan' plough, which has commended itself to so many cultivators, was conspicuous ; but it is too highly priced for general adoption. There are few ryots who would pay Rs. 16, when they can get a plough equal to it in every respect for Rs. 3-8. A pump, called the 'Deluge' we thought particularly good. It is easily worked, and throws up a large and constant supply of water, and does not require more than one man to work it. The price, however, is prohibitive. The implements sent by the Bengal Iron Works Company, Burrakur, were not only strong and serviceable, but extremely low-priced. Among ploughs, the 'Birati' commended itself to our judgment. It is light, strong, and not likely to get out of order. Its suitability for rice lands is its most essential feature, while the mould-board is not so broad as to make it difficult for an ordinary pair of bullocks to work it easily. Next to this, was the Burrakur No. 3. This implement is suitable for all lands, but requires a rather strong pair of bullocks to work satisfactorily. Both these ploughs are priced at Rs. 3-8 each ; and having the share and mould-board of cast iron, are not likely to get out of order. It may be mentioned here that the 'Birati' was originally invented by Colonel Neill, but it has been somewhat modified and improved at the Burrakur Iron Works under the direction of Ritter von Schwarz. There were two chain pumps, a single and a double ; the former worked by two men, and the latter by a pair of bullocks. Both of these are excellent implements, moderately priced, and not likely to get out of order in a hurry. We understand that many of them have already been sold to the ryots, and many orders have been registered for more. Ritter von Schwarz, who is the designer of the above, also turned his attention to cart wheels, and turned out a pair very much like the common country wheels, but much improved, having the nave of light iron-work, which makes them lighter, stronger, and not liable to climatic influences, as is the case with common wooden naves, and not likely to get out of order. The parts are, moreover, interchangeable at the trifling cost of two or three annas. The price of a pair of such wheels is Rs. 20, which is exactly what it costs a ryot to make them of the common kind. In fact the implements turned out by the Burrakur Iron Works have one prominent feature, *viz.*,—cheapness, with which are combined strength simplicity and adaptability to Indian conditions of agriculture. Ritter von Schwarz, who has the direction of affairs at Burrakur, deserves much credit for his labours, the results of which have proved so satisfactory hitherto.

The Agricultural Department of the North-Western Provinces, among other things, exhibited an American sugar evaporating pan, which was set in full working order. This pan has certain advantages, but in our opinion does not counterbalance those of the ordinary country pan, of which more later on. The Bengal Agricultural Department, in the person of Mr. A. C. Sen, exhibited a plough to which we referred some few months back. It is an invention of Mr. Sen, and is on the style of Messrs. Jessop & Co's "Hindoostan" plough, to which, in our opinion, it is much inferior, not only in its working, but general get-up. It is more flimsy in make, but it is about one-third the price. We do not think, however, that it will 'take' with the ryots.

Messrs. Burrows, Thomson, and Mylne, of Behea, had their sugar-cane mills in full working. These mills are too widely known to need any description from us ; but we invite a perusal of a few 'notes' given to us by Mr. Mylne on this subject, which we reproduce in another column. Another machine exhibited by this firm was a centrifugal sugar crystallizer. The working of this simply astonished Sir Rivers Thompson and his party, especially the Revenue Secretary to the Bengal Government. We saw crystallized sugar made by this machine in *two minutes* ! The boiled juice was put into it, and the machine was set in motion, when lo ! in two minutes, the result was crystallized sugar. It appears that Messrs. Burrows, Thomson and Mylne have been working this centrifugal for nearly ten years in their district, and only now have the people come to learn the great value of this machine. Its price is certainly very high (Rs. 460), but some of the important ryots have already purchased a few machines. Mr. Mylne gave us to understand that the common country cane juice evaporator is superior to any thing more elaborate, and this he proved to us at Dumraon.

There was also a ploughing match on the evening of the 3rd instant after the opening of the exhibition, and here the merits of the various ploughs exhibited were to have been tested. In our opinion, however, the ground chosen was too soft, having been *already ploughed* and therefore it was not easy to form a correct estimate of the capabilities of the several ploughs. To our mind the 'Birati,' the "Burrakur No. 3," and the "Hindoostan" gave the best results. To which of these the prize was awarded we have not yet been informed.

An economic museum has been established also by the Maha-

raja in connection with the demonstration farm, where there is no doubt the ryots will, in time, find some thing to interest them. The term 'demonstration farm' appears to be a misnomer, as it is not intended to *demonstrate* to the people what the agricultural officers are themselves only trying to learn by repeated experiments. We are therefore glad to learn that it is intended to change the name to that of 'experimental farm' We visited this farm, and saw several plots sown with wheat and other crops under various methods of treatment as to soil.

There is little doubt that the State of Dumraon is much ahead of most places in Bengal in the way of agricultural reforms, and this is due in a great measure to the peculiar natural advantages possessed by Dumraon, added to the favourable terms enjoyed by the cultivating classes as to their holdings. The country is very fertile, having a splendid natural soil throughout, with canals and rivers, which leaves very little to be desired. Add to this the desire of the Maharaja to introduce intelligent reforms.

In conclusion we have only to say that if next year it is intended to hold another agricultural exhibition, sufficient time should be allowed to intended exhibitors to prepare their exhibits: and that more attention should be paid to the *business* part of the function. The time of the year should also be so selected as to allow the produce of the latest corps being staged. March would appear to be a good month for this purpose.

COD-LIVER OIL AS A CATTLE FOOD.

The suggestion of Cod-Liver Oil as a cattle food perhaps savours of the incredible; but it is nevertheless a fact that the experiment has been tried with success in England. In a country like India, where from want of proper food, and the wasting diseases which are so common to the cattle in this country, as often to make them resemble 'Pharoah's lean kine,' this discovery of the properties of Cod-Liver Oil for fattening cattle is worthy of attention. Cod-Liver Oil has hitherto been associated in our minds with the nourishment of the human system, but when it is understood that this oil differs in its nature from castor and other aperient oils, and is distinctly nutritive, it will be easily understood how it can be used for fattening cattle, as well as the rearing of sickly and inferior stock. Animals, like human beings, require a certain amount of fat or oil to supply them with the requisite amount of caloric. The fact is recognised in many forms both for man and beast. In the case of such animals as horses, sheep and horned cattle, the fat has usually been supplied to them in the form of linseed or cotton cakes, and the substitution of a more nutritive oil is therefore a question of comparative expense. This would, therefore, appear to be solved by the use of cod-liver oil. Any pasturage from roots and twigs, deficient in nutrition, may be made the vehicle for the transmission into the stomach of the commissariat camel and mule of a small quantity of cod-liver oil, which will sustain and keep in condition transport animals on the line of march. The pasturage of our troops, so inferior in seasons of drought and so liable to engender colic in wet weather, can now be safeguarded. Mr. Alfred Bonrwick, the managing director of Messrs. Jensen and Co., we learn, himself greatly interested in agricultural pursuits, conceived the idea of trying the experiment of feeding cod-liver oil on a commercial scale. It would be a long history to relate the means by which the perfecting and cheapening of the supplies have been effected. They involved the outlay of much capital. In carrying them out a little town has been created at the head-quarters of the new industry, situated at Brettesnoes, in the Lofoden Isles, the very heart of the best Norwegian codfisheries. There, in the midst of perhaps the most lovely scenery in Norway, has gradually risen a huge commercial undertaking, affording, in this branch, employment for over 500 fishermen and working people.

It is claimed for Jensen's Norwegian Cod-Liver Oil, that it protects the chest and lungs of horses and cattle exposed to wet and cold, being a nourishing food, a stimulant, and a valuable curative agent and safeguard against pneumonia and influenza. It increases the yield of milk and the richness of cream, and whether with goats, calves, lambs, pigs, or puppies, the results have been found most efficacious. Writing on this subject the *Livestock Journal* says:—

The cod livers are now obtainable perfectly fresh, a vitally important matter in the preparation of the cod-liver oil. The bodies of the cod and the herrings produce an oil (trade oil) used for many purposes, principally for dressing leather, to render it soft and supple. The bones and flesh, formerly a waste product, now, when dried and ground up, form the base of what is known as fish potash manure. By dint of thus increasing and multiplying the uses of the fishing harvest in the Norwegian waters, the original cost of all has been brought to a minimum, and cattle oil—that is, cod-liver oil—intended for feeding animals is now manufactured and sold by the company at rates rendering it available for any stock-keeper in the country, whether a breeder of horses or sheep, cattle or pigs, or oxen or fancy dogs, or fancy fowls. Sir C. A. Cameron, M. D., President of the Royal College of Surgeons, Ireland, writes of this cattle oil:—"It is an excellent idea to give this oil to cattle. A few ounces added daily to their food, would be most beneficial to their health, and would help materially to fatten them." So it has proved in practice! With young stock—calves, fowls and lambs especially—brought into the world in the midst of the most inclement weather, as it is often their unfortunate lot, the cattle oil is said to be the means of saving hundreds of valuable young lives. It provides them with warmth, the first necessity of young life. A full grown horse or cow is given a wine glass full of the cattle oil night and morning. It costs almost exactly 1*d*, per day. A ton of cake, costing about £9 10*s*, contains 112 lbs. of oil. A barrel of cattle oil, costing from £4 10*s*. to £5, contains 220 lbs. pure cod-liver oil, the highest form of nutriment, and the most efficient to a perfect digestion known. The most important points claimed, therefore, for Jensen's cattle oil for farmers' use, are its (1) powers of saving young life, especially lambs and calves, and (2) its highly fattening properties, both for young and full-grown stock. One of the greatest companies in the world as owners of horses is giving it an exhaustive trial. If it will keep their horses free from influenza alone, it will pay them well. If it will put up the average of the working days of a horse six to nine months, as results already achieved make very probable, shareholders can congratulate themselves on an increase of dividend from the use of the cattle oil.

We learn that in order to introduce Messrs. Jensen's cod-liver oil for cattle to the notice of the authorities in India, Messrs. Hertz and Collingwood, the London agents, are sending out a trial consignment, so that we may at an early date be able to say something definite on the subject, so far as India is concerned.

Mr. FINUCANE ON AGRICULTURE IN BENGAL.

Although the Dumraon Agricultural Show is a thing of the past now, yet we cannot omit to publish the speech of Mr. Finucane, the Director of the Bengal Agricultural Department at the State dinner on the 4th instant at Dumraon. Unlike a daily paper, we are necessarily a little behind hand, but as this journal professes to maintain a *record* of all events of interest to agriculture, this speech could not very well have been omitted. Mr. Finucane said:—

Sir Rivers and Lady Rivers Thompson, Maharaja, ladies and gentlemen,—The toast which I have the honour to propose is that of the Committee of the Dumraon Raj Agricultural Show. Our host the Maharaja, and Committee have on the present occasion associated the Agricultural Show with a varied and liberal programme of amusements, and because they think these things to be necessary or at all times even appropriate accessories of agricultural shows, but because they wish to give expression to the desire of the Maharaja and of all classes in Behar to give his Honor, Sir Rivers Thompson a suitable reception, and one worthy of the esteem, respect, and, I may say, affection with which he is regarded in Behar, by all classes of the community. I will ask your indulgence for short time, while I make a few remarks on some topics suggested by the agricultural part of the programme.

When more than two years ago his Honor the Lieutenant-Governor instituted an Agricultural Department in these provinces and placed the supervision of that Department in my unworthy hands, I confess that I undertook the duties entrusted to me with doubt and hesitation; with feelings akin to despair. The work of an Agricultural Department in India is two-fold: first, that connected with surveys and the record of rights; and secondly, that connected

with agricultural inquiry and improvement. The object of the survey and record of rights in Behar was as some of you gentlemen are aware, to ascertain and record the rights and liabilities of all classes of the agricultural community, from landlords of the highest degree down to the lowest under-ryot cultivating the soil.

In connection with this part of the duties of an Agricultural Department, I had no anxiety. I felt then, as I feel now no doubts regarding the feasibility of carrying out a survey and record of rights, and had no misgivings regarding the advantages which would accrue to all classes of the agricultural community from the impartial and efficient execution of this work. It was not in connection with this, which is perhaps the main branch of the duties which fall to an Indian agricultural department, that I felt anxiety, but it was in connection with that part of the duties of these departments, which is connected with agricultural improvement, that one could not fail to be impressed with the despairing reality of how little can be done in this direction by any individual or any organization.

It was not that there was no field for work or that no improvement was possible in the system of agriculture at present followed in these provinces. On the contrary, when one thinks of the average Indian ryot toiling under the fierce heat of an Indian midday sun struggling knee-deep in mud to guide his plough-cattle by twisting their tails, now addressing them in words of humble entreaty, and now imprecating curses upon their devoted heads, it must appear almost ludicrous to suppose that he, the ryot, has devised for himself a system of agriculture which is so perfect and complete that he and his class alone of all others classes and of all other professions in this country has nothing to learn from Western knowledge and nothing to gain from Western improvement. The field for improvement is vast and the possibilities are great; but the objects in the way of the introduction of such improvements are equally great and difficult to surmount. Before you can attempt to introduce agricultural improvement with any prospects of success you must first have agricultural security; next you must have—or if you have it not you must create—a real interest in, and desire for, such improvements on the part of the people themselves; and above all you must have capital in the hands of the agricultural community before they can adopt improvised or expensive methods of cultivation

Agricultural security is necessary, for it is evident that unless those who plough and sow have some reasonable assurance that they will also enjoy the fruits of their industry, it is futile to talk to them of agricultural improvement, and it is equally evident that given such security it is useless to press upon them innovations which they do not want and have not the intelligence to understand or the capital to work.

Impressed with the magnitude of these difficulties, I entertained grave doubts of the possibility of effecting anything in the way of the introduction of agricultural improvement, in which there then appeared to be no interest among the people chiefly concerned, and for which there appeared to be no real demand.

I found, however, that an agricultural exhibition had already been organised in this district, and it appeared that there existed here a genuine desire for the introduction of agricultural improvements and a real interest in agricultural inquiry. In short the conditions requisite for the introduction of improvements in agricultural practice were here fulfilled to a larger extent than perhaps in any part of these provinces.

If I am asked why I say that the conditions are more favourable here than elsewhere, my answer is this that agricultural security exists because we have here in the Maharaja an excellent landlord, who though as the chief of a warrior caste, he can trace his lineage back in unbroken line to a period three hundred years anterior to the Norman conquest in England, and though he may point with just pride to the fact that he and his fathers have held their own in this place in the famed jungles of Bhojpore through the varying vicissitudes of five hundred years of Indian history; yet he has no prouder boast, no more honorable tradition than this, but through all these long ages his predecessors in this Raj have invariably respected the ancient rights of their tenantry and adhered to the ancient customs of their country.

Our host, the present Maharaja, aided by his manager, Rai Bahadoor Jai Prokash Lall, has wisely adhered to those honoured traditions and family customs; and the result is that the Maharaja is honourably distinguished among the great territorial proprietors of these provinces in this that he is surrounded, in the class of *guzasthadars* of whom we saw many specimens at the opening of the exhibition yesterday, by a contented and prosperous tenantry sitting at easy rents jealous of their rights, able and determined to maintain them. Hence it happens that they on the one hand interest themselves in agricultural improvement, because they feel confident that there is no thought of changing their rents in consequence of such improvements when made at their expense; while the manager fosters and encourages that interest in various ways, among which may be mentioned the opening of an experimental agricultural station and a seed depôt.

Such management as this is wise and good management, for surely it is better as well as more honourable and nobler for the Maharaja to have a solvent and contented peasantry than to have inflated and fictitious rent-rolls with a discontented tenantry, harassed by the exactions of underlings, and, as is often the case, distracted by litigation from the peaceful pursuits of their calling.

Among other reasons why it is that an interest in agricultural improvements has been excited in this district more than elsewhere may be mentioned that the district is fortunate in having now in Mr. Power, and, as it had two years ago, when these exhibitions were started, in Mr. Nolan, Collectors who, connected as they are by family ties with ownership of landed property in their own country, and recognising the duties as well as the privileges that attach to the possession of property, sympathise with all classes of the agricultural community from raja to ryot; and therefore, from personal choice no less than from a sense of duty, have themselves both taken a keen interest in the agricultural prosperity of their districts, and at the same time have used their legitimate influence in exciting such interest among others also.

Lastly, we have in this district and on this committee, gentleman, like Messrs. Macnamara and Fox, of long experience and practical knowledge of the requirements of the district, and like Messrs. Myine and Thomson of Sehees and their representatives, who, while largely and specially interested as landholders in the agricultural welfare of this locality, have also done more for the introduction of improved agricultural machinery in India in general than perhaps any private firm or public organisation in this country. Such, gentleman, are some of the reasons why I say that there is a real interest excited in agricultural improvements in this locality and why it is, there is some ground for hope that here if any where an agricultural department co-operating with local effort may be able to effect some real and substantial improvement. It may also be hoped that the example here set, may, with advantage be followed elsewhere

I have already detained you too long and have, before concluding, only to make a remark on the functions of an agricultural department as regards agricultural improvement. His Honor was kind enough to suggest yesterday that the department might adopt as its motto "The man who makes two blades of grass grow where previously only one grew is a benefactor to his country." Well, gentlemen, though it must be the ultimate aim of all agricultural inquiry and improvements to make two blades of grass grow in the place of one, yet remembering that greater one has said "Pride goeth before a fall," I fear it would be rash to adopt the motto which his Honor in his generous recognition of our small efforts suggested. All I fear we can pretend to do is to collect and collate and place at the disposal of the public such information as may be available regarding agricultural topics; to carry on continuously such experiments as are already being carried on here by Mr. Allen, with the care and caution that scientific methods require; and to publish the results of these experiments for general information. The people themselves must work out their own agricultural regeneration. All we can do with our present agency, as indeed with any agency likely to be available within our time, is to encourage and support, so far as it lies in our power, such local efforts as has been made here by the Maharaja,

When in the enjoyment of many years of health and happiness which we all hope awaits Sir Rivers Thompson in his native land, he looks back to the many acts of an eventful administration, while there will be none to which he cannot look with the approving conscience of "an honest man, the noblest work of God," there may doubtless be some which in their results will not have fulfilled his expectations and others which will have answered his most sanguine anticipations. I would feign hope though, in view of the difficulties to which I have referred, I can scarcely dare expect that among the latter will be found the establishment of an agricultural department in these provinces. If, however, the efforts which have been made in the direction of agricultural improvement here and elsewhere during his Honor's administration should bear fruit to however small a degree, and at however distant a period of time, and if the impetus to agricultural improvement given in this district by our host, his manager, and our committee, be persevered in, and

the example here set followed elsewhere, and any real and substantial agricultural improvement should ensue—whether through the agency of an agricultural department or any other agency—that result will, in no small degree, be due to the encouragement, the support and the assistance which the officers of the Agricultural Department have received from the members collectively and individually of the Dumraon Agricultural Exhibition Committee whose health I now ask you to drink, coupling with it the name of their excellent honorary secretary, Mr. Jenkins. It is on Mr. Jenkins that the brunt of the work connected with the organisation and management of these exhibitions has fallen, and it is largely to his personal exertions and influence in this subdivision that we owe whatever measure of success you may think has attended the present and former agricultural shows at Dumraon.

NOTES ON THE BEHEEA SUGAR-CANE MILL.

[By Burrows, Thomson, and My'ne.]

SUGAR-CANE being grown in India in small patches, each cultivator squeezing his own cane and converting the juice into *goor* (concrete sugar) on or near the field, it was seen that it would be very advantageous to him, if an effective machine could be devised, which could be readily carried from field to field.

When the Beheea Mill was introduced, the only apparatus used by, or within reach of the cultivators, were primitive wasteful machines made of wood or stone, wasteful of time, power and a considerable percentage (in both quantity and quality) of the sugar in the cane.

To secure quantity with economy, it is necessary that friction be reduced to a minimum so as to utilize the fullest proportion possible of the small power which the cultivator has at his command. Quality requires, amongst other essentials, quick extraction of the juice of whole canes by one passage through the mill, and that all surfaces with which the juice comes in contact be kept clean. The extreme liability of cane juice to fermentation, and the consequent destruction of its crystallizable properties render such conditions very necessary if all the sugar which the cane is ready to yield is to be obtained from it. Mr Alfred Fryer, the inventor of the Concretor, an eminent authority on sugar manufacture, says, "Cane juice from the moment it leaves the cells should be treated with the same care and cleanliness as new milk in a well ordered dairy."

The native cane mills have most of the serious faults which machines constructed for such a purpose could have. In the *gundi*, as generally made, the lower sill or base plate is a large block of wood partially or wholly bedded in the ground, having a rectangular though of considerable size cut in it, into which the juice falls as it comes from the rollers, the vessel to receive the juice has consequently to be sunk still deeper in the ground, where it remains, the juice being baled out of it into other vessels, in which it is carried to the boiling (or evaporating) pan—the canes have to be cut in short lengths, and passed five to ten times between the rollers, before the juice is extracted—the wooden bearings, and working surfaces being untrue and irregular, cause excessive friction, and consequent loss of power. The kolhu (pestle and mortar arrangement), whether of wood or stone, is open to the same serious objection (with the addition that the cane has, for it, to be cut into still shorter lengths, *i. e.*, from two to five inches long. The construction and action of such machines greatly reduce the crystallizable properties of the juice, as (1) by cutting the cane into short lengths, a large number of cells are exposed to the air inducing fermentation in each one so opened; (2) by passing partially crushed canes repeatedly between rollers, a further degradation of the juice is caused through the repeated crushing and macerations of the fibres; (3) by this deteriorated juice, during its passage to the receiver, being in contact with germ-infected surfaces especially in the trough of the bottom beam where it gets arrested and churned by the lower ends of the large revolving rollers; (4) by the condition of the receiver which, being seldom washed or cleaned, has its inner surface coated with particles in a continually advancing state of decomposition; (5) by the transfer of the juice from this vessel into a second, in which it is conveyed to the evaporating pan, it is exposed to further action of the air, and further contact with foul surfaces.

India is essentially an agricultural country and its cane fields cover a greater area than is under cane in the West Indies and Mauritius: yet an industry of this magnitude and value has been left in the same rude wasteful condition as to absence of cleanliness or of speed in manipulation which marked it a thousand year ago. The effect is as if destruction of a large proportion of the crystallizable properties of the cane were the end in view, instead of the securing of a full outturn of good exportable sugar as the outcome of a whole year's labour and outlay on the part of the cultivator. Every moment's delay, every particle of foreign matter, every inch of porous unclean surface with which the juice remains in contact, originates and spreads the germs of fermentation, reducing in their active progress the crystallizable properties of the juice and proportionately decreasing the value of the product

The industry, though as a a whole vast and valuable, is made up of an infinite number of minute individual interests, each working apart from and independent y of the other, which have suffered from inherited prejudice, ignorance, and limited means, all of which are adverse to change or experiment. These peculiar conditions could only be met and overcome in this instance by an adaptation equally special and definite, so designed as to ensure that the result in working expenses, quantity and quality of produce, should testify to the cultivator that money invested in a machine of novel construction would be a profitable investment, and to the money-lender, that the principal and interest of a loan for the purchase of one would be quite safe; that the cultivator should be further satisfied of the adaptability of the new machine to himself, his bullock, limited accommodation, and felt ignorance of the simplest mechanical combinations. It was seen that great advantage would result if a high degree of efficiency could be secured in conjunction with simplicity of construction and portability; that the machine should be easy to fix or work to clean and repair, and yet be firm when so placed, wherever on his land it might best suit the cultivator to fix and work it, and that it should not be easily broken or disarranged, otherwise he would have no confidence in it, or be able to trust it in lieu of the old machine, so well known to him and his fathers.

In designing a machine to take the place of the native mills, our aim therefore was to produce one which would remedy the serious defects of those appliances, and which would at the same time be adapted to the means of the cultivators; be so simple in construction, that the village carpenter or blacksmith might repair it; be made as far as possible of materials which could be got in the villages, not liable to serious derangement, by the blundering of people inexperienced in the management of exact machinery, and of such form and size as to be easily portable.

The result of our contriving and experimenting is the Beheea Mill, which is so constructed that—

(1) The entire machine can be carried from field to field without taking it asunder or disturbing the rollers and other working parts, thus saving the cultivators the heavy expense they incur for carrying the cane long distances

(2) Except the rollers, all the parts (iron and brass as well as wood-work) can be repaired or renewed in the villages.

(3) The form and arrangement of the frame secures a maximum of stability with a minimum of material and workmanship—the special fitting and securing of the splayed legs to the upper and lower beams with through bolts, enables it to be firmly fixed ready for work in a few minutes, by simply making four small holes in the ground six or seven inches deep and fixing the feet in them; and also fits it to withstand the rough treatment which a machine in such hands is subjected to. A further advantage of this arrangement is that the height of the machine when fixed for work can be adjusted to suit the size of bullock used.

(4) The upper beam is so made that it can be readily removed to get at the rollers, and all working parts for cleaning, &c., without disturbing the rest of the machine.

(5) The rollers are of metal, and are made true on their surfaces and journals; the steps also (on which the roller spindles rest) and the bushes (or bearings) are of metal of novel design so as with the smallest cost to reduce friction to a minimum. These arrangements, combined with the small size of the working surfaces, compared with those of native machines, ensure a much large proportion of the motive power being available for productive work.

(6) The juice as it leaves the cane runs down the clean iron rollers on to a concave metal plate so made as to catch the whole, and placed at such an angle as to ensure its rapid descent to the receiving vessel which is placed on or above the ground instead of in it, thus admitting of its being washed and fumigated every time it is emptied, which is an easy inexpensive mode of checking decomposition, suggested by us, and the only one which can be readily adopted by native cultivators.

(7) To prevent the juice running along the bottom surface of the rollers and down the spindles to the steps and lower bearings, the lower edges are made with an overhanging lip which ensures the whole of the juice leaving them quickly, free from oil, dirt and other foreign matter.

(8) A thin rod of round iron is placed below the rollers and forms an inexpensive but efficient contrivance for preventing the cane from dropping below them, and getting away unsqueezed—the problem here was, to effect this without intercepting the juice, and the plan adopted was found to be the best solution.

(9) To prevent the cane, when spread out by squeezing, getting between the teeth of the pinion (or toothed wheel) a flange (or shroud) is cast on the latter which, besides effecting this, strengthens the teeth and reduces the risk of their being broken by rough usage. A recess or groove is provided in the opposite roll or pinion to receive this flange or shroud, and at small bits of cane may lodge in it during the working of the mill, a suitable cleaner is attached to keep it open and free.

(10) The arrangment for the lever or driving pole is such that any suitable inexpensive piece of would or bamboo may be used, and the mill can be easily worked by a single plough bullock witb only with only a boy to put in the cane and keep the bullock going. If the latter be going too slowly, the boy touches him up with the next cane he takes up, so that with trained bullocks no separate driver is needed. In Shahabad and many other districts, hundreds of mills are being worked thus.

(11) If good rollers are used, and the frame be properly made, one of these mills will with moderately fair treatment and very trifling repairs, do good work through eight to ten seasons.

How far this machine has solved the prob'em we found waiting solution, the improvement of the sugar industry of India, and how far it met a real want is shown by the demand that has arisen for it amongst growers of cane and by the many imitations which, since it became known, have been brought out, none of which, however, have yet proved equal to it in the practical test of a season's real work in the hands of the cultivators, nor is there one which does not copy and embody essential features of our machine which, as shown above, are our original contrivances.

The yield of juice from sugar-cane, and quantity of sugar obtainable from the juice, varies with different kinds of cane, soil, climate, and ripeness, of the cane when squeezed. The rate (or speed) at which a mill works is also a matter of importance, much juice being lost if the rollers revolve too fast to admit of the whole getting clear away from the cells in which it is stored. The following is from "Sugar Growing and Refining" by Look, Wigner and Harland, recently published by Spon :—"Repeated experiments all tend to prove, that while only 46% of the juice is extracted by a speed of eight revolutions per minute, as much as 70% is obtained by the same mill when the speed is reduced to 2½ revolutions" (page 125). A rapid mill and a slow mill, which were worked on an estate in Porto Rico, gave the following results :—The rapid mill, had rollers 22 inches diameter, and an average surface speed of 24 feet per minute, the slow mill rollers 36 inches diameter with an average motion of nine feet per minute ; the rapid mill gave 59·9 lbs. juice per 100 lbs. cane, while the slow mill extracted 77 61 lbs. juice from 100 lbs. cane. On a fine estate in Java, a large mill having rollers 70" long by 32" diameter (in good working order) extracted from Mauritius, Java, and Chinese cane (1¼ to 1¾ diameter) 69·946 lbs. juice per 100 lbs. cane. And on another estate, similar in character but the soil of which was not so rich, the outturn of juice with a mill having rollers 60" by 30" in excellent working order, was 67 to 68%. The average yield of vacuum pan, centrifugal and sun-dried sugar over 11 years in the first of those estates was 26·41 cwts. per acre, and from the second 28·73 owts. (Page 125-6).

The portable Beheea Mill having a pair of rollers 8" long 7" diameter, (weighing less than five maunds) worked by a single bullock extracts 70 lbs. juice per 100 lbs. Bengal cane, (averaging an inch diameter) and with the rollers going nine feet per minute, crushes 400 lbs. per hour. The double squeeze mill, having two rollers 8" by 7" and one 8" by 4½" extracts 73·4 lbs. juice per 100 lbs. cane in one operation, crushing 400 lbs. per hour.

This small machine has thus brought within easy reach of the cultivators of India, the means of extracting from their cane crop as high a percentage of juice as is obtained in other cane-growing countries, with large steam-driven mills, which involve the outlay of large capital, and it prevents the enormous waste of power, time, money, and produce (quality as well as quantity), which was caused by the machines they were using, none other being within their reach when the Beheea Mill was introduced.

The Beheea Mill was first introduced into our own district (Shahabad), and the marked improvement in quality of *goor* from the juice expressed by it gradually becoming known in other parts of India, brought purchasers of that article from the N.-W. Provinces, Punjab, Rajpootana and the Bombay Presidency. The reduction which the cultivators found in the daily cost of working, the quantity of work done being at same time greatly increased, caused a rapid and extraordinary extension of the area under cane, which, measured by the yearly increasing exports by rail from the district since 1874, amount to about 30,000,000 maunds and this at an average value of Rs. 3 per maund is Rs. 9,000,000

Mr. W. Renwick, who has made upwards of 4,000 of these improved mills, letting them out on hire in districts of Rajshahye, Dinajpore, Pubna and Nuddea, finds the cost of making three maunds of *goor* by the native mill to be Rs. 5 3-7, and by the Beheea Mill Rs. 2-15 2, being a saving of Rs. 2-4-5 or 12 annas per maund.

In the Hooghly and the Burdwan districts where the *gundi* (wooden-roller) form of native mill prevails, Baboo Kally Dass Mookerjee, of Bidyabatty, reports that making three maunds of *gundi goor* costs Rs. 5-8 6, and making four maunds of Beheea Mill *goor* Rs. 3-7 0, showing a saving of about one rupee per maund with increased value for improved quality.

Detailed reports from Mozuffernugger, Meerut and Roorkee, N.-W.P., show the average cost of working the *kolhu* to be Rs. 4 3-9 per *bari*, (a measured quantity of juice by which the labourers are paid,) and the cost of working the Beheea Mill to be Rs. 2-6 0 per *bari*, showing a saving to the ryot of Rs. 1 13-9. There is thus a saving of 44 per cent in the cost of labour, besides improvement in the quality of *goor* produced of 10 to 15 per cent.

About 50,000 of these portable domestic cane mills have been made and handed over to the cultivators during the last nine years, and upwards of 40 000 of these must have worked during last season in the cane fields of India.

The average outturn per day per mill may be taken as four maunds of *goor* or *rab*. The cane season averages in India about 90 days ; taking 60 as the average of working days for each mill, the produce per mill will be about 240 maunds *goor* (or jagri) per season, and 40,000 mills working last season will have yielded 96,00,000 maunds worth at Rs. 3 per maund, Rs. 2,88,00,000.

The saving in labour per day may be safely taken as 12 annas, say Rs. 45 per season, which, on 40,000 mills, is Rs. 18,00,000, and ten per cent increase in value on Rs. 2,88,00,000 worth of raw sugar, is equal to Rs. 28,80,000. There is thus a clear yearly benefit to those who, up to the present time, have adopted the Beheea Mill, of Rs. 46 80,'00 equal to Rs. 117 per mill or per family in each season. Those now in possession of the improved mills represent only a small portion of the sugar growers of India.

Thus in 1874-5 the total gain from 800 mills at work—reckoning at the rate of only Rs. 117 per mill, while the Punjab trial show Rs. 360 and others quite as much. Was not less than Rs. 93,600.

In 1876	the total gain	from	1,500	mills	at work was	1,75,500
1817			2,300	,,	,,	2,69 100
,, 1878	,,	,,	5,700	,,	,,	6,66 900
,, 1879	,,	,,	9 000	,,	,,	10 53,000
1880	,,	,,	12,090	,,	,,	14,04,000
1881	,	,,	17,000	,,	,,	19 89,000
1882	,	,,	25,000	,,	,,	29,25 000
1883	,	,,	30 000	,,	,,	35,10 000
1884	,	,,	40,000	,,	,,	46,80,000
1885	,,	,,	55 000	,,	,,	66,35,000
1886	,,	,,	70,000	,,	,,	81,90,000
						3,13 91,000

This will be admitted by those who examine the subject carefully, to be a moderate calculation of the gain or benefit to the sugar industry of the country, during ten sugar-growing seasons, by the application of a simple combination adapted to the condition and need of the people. That is to be shown by the results given in the following extracts from reports by Messrs. Fuller, Logan, Renwick and others, quoted below :—

The Government of India, in a resolution, dated 30th May—1882, on Sugar production in India, says :

"The Beheea Sugar Mill invented by them (Thomson and Mylne) has undoubtedly proved a great success, and is gradually taking the place of the native implement."

In a report issued by the department of Agriculture and Commerce, North-West Provinces, dated 10th June 1880, it is stated:—

"If we may apply the result of this experiment to the total production of sugar in these provinces, it follows that by the substitution of the Beheea roller mills for the *kolhu* now used,

(To be continued.)

THE FLOWER SHOW.

THAT horticulture in India is making good progress is evident, and the competition at the flower, fruit and vegetable show held at the Agri-Horticultural Society's garden on Thursday evening bears out this conclusion. We have been present at many of these annual functions, but this show was, in our opinion, far in advance of anything of the kind we have witnessed here, or for that matter, anywhere in India. This remark applies especially to the flower and ornamental foliage section, which could scarcely have been surpassed at similar shows in England. The arrangements made by the Society in the way of providing staging, tents, &c., for the exhibits were on a better scale than we have seen them before, the credit for which must be assigned to Mr. R. Blechynden, junior, the deputy secretary, under whose experienced direction the show was got up. There was a very large and distinguished gathering of visitors, and later on in the evening her Excellency, the Countess of Dufferin, accompanied by some distinguished friends, as well as Sir Rivers, Lady and the Misses Thompson, honoured the occasion with their presence. The evening was further enlivened by the band of the 38th N.I., which played a select programme of music at intervals.

The greatest attraction of the show was Mr. S. P. Chatterjee's tent. This enterprising nurseryman quite surpassed all his previous exhibits. He laid out his tent in a manner which only an experienced florist, with an eye for the beautiful, could be expected to do. There were on one side little reservoirs filled with water, with rock-work, planted with ferns, Begonias, Selaginellas, and a host of other choice plants too numerous to detail, and at the back were arranged the plants with which he competed for the Grant Silver medal. Among the more rare plants we noticed a new Crinum of magnificent growth which at first sight we mistook for a Dracæna. A fine specimen of Pritchar dia Grande also took our fancy. There were numerous other new palms, crotons, Anthuriums, Dracœnas, Dieffenbachias, Marantas, Alocasias, &c., which were all staged to great advantage. Here Adiantums of all kinds, especially Farleyense, were seen in luxuriant growth; on the opposite side there was quite a carpet of roses embedded in moss, with floral decorations over and around large blocks of ice, which had a fine effect. The sweet perfume of flowers in this tent was almost overpowering. It is needless to say that Mr. Chatterjee won the Grant Silver medal worthily. Mr. Charles Maries of Durbhunga had also staged some plants in this tent—not for competition however—among which may be mentioned an entirely new strain of beautiful Begonias raised by himself, some new annuals, among them Layia Elegans, new miniature sunflowers, and a huge double sunflower. In S. P. Chatterjee's exhibits we noticed some specimens of exceedingly rare plants, amongst these was a red-stemmed Arica, and some beautiful Brazilian orchids in full flower. The next collection of importance was that of Baboo J. C. Biswas, of the Empress Nursery. This was also very good, and surpassed by far the collection for which he gained the Grant medal last year. There were some very fine grown specimens here, and many new and rare plants, and were it not that Mr. Chatterjee had displayed unique taste in the arrangement of his collection, there would have been very keen competition between them. As it was, Mr. Biswas's collection was "highly commended." Among new and rare plants we noticed a Trichomanes, Dieffenbachia Jeemanii, Paullinia thructifolia, Asparagus tenuuiensis, and many others too numerous to detail.

The Royal Botanical Garden, Seebpore, as usual, staged some magnificent specimens, not for competition, but to add to the attractions of the show. Prominent among others was a huge specimen of Asplenium nidis, with other ferns, palms, cycads' anthuriums, crotons (especially C. Readii), and a host of others. The Agri-Horticultural Society also staged some fine plants, but they were too closely packed to produce the required effect However, this and many other stands added to the attractions of the show

Among other important competitors with growing plants were the Eden Gardens, Belvedere, and the Maharaja of Cooch Behar who among them managed to carry off many of the best prizes. Messrs. E. J. King, A. C. McFarlane, G. Bartlet and P. Playfair carried off the greater number of prizes among amateurs. There was no competition for camellias, orchids and palms. In roses, Belvedere carried everything among professionals, and Mr. King, the Maharaja of Cooch Behar, and Mr. A. C. McFarlane among amateurs. The roses were very fine this year. The ferns and Begonias were also above the average, the prizes going to Belvedere, Cooch Behar and the Eden Gardens. The prizes for Panax and Aralias, Dracœnas, Dieffenbachias and crotons were almost equally divided between the above and J. C. Biswas, with Messrs. McFarlane, Bartlet and King among amateurs. These plants were particularly well represented, and so were those of Coleus, prizes being awarded to the Eden Gardens, Cooch Behar and P. Playfair. The annuals were not quite up to the standard, but this must be attributed to the extraordinary lateness of the season. The prizes for the best collection of 20 foliage plants, and that for rare plants not before exhibited, were won by S. P. Chatterjee.

The cut flowers were simply enchanting, and the crowd round them showed their intense enjoyment of the floral feast by frequent ejaculations of admiration. The Camellias were not perfect, but good, the prize going to Suda *malee*. The best stand of 24 roses was certainly that from Belvedere which got the first prize, Rai Bahadoor P. C. Banerjee coming in first among amateurs. The best stand of 12 was that from the Barrackpore Park among professionals, and P. C. Banerjee among amateurs. Some blooms of Paul Neron would have astonished a few of our English rose growers. The prize for stands of six and four blooms were taken by Belvedere, Cooch Behar and P. C. Banerjee. The best single specimen rose came from the Barrackpore Park, and was a Paul Neron. The bridal bouquets were the admiration of all, but the names of the prize-winners did not transpire. The President's prize for rare or well-grown plants not included in the list was won by Mrs. Kirkman with a splendid stand of Polyanthus Narcissus, and a special prize was awarded to Mr. McFarlane. To our mind, however, the most chaste special collection was that of Miss E. Harwood, with a glass case containing beautifully grown plants of Adiantum Farleyense, Begonias, &c., to which a special prize was awarded. The gold medal presented by Rai P. C. Banerjee was won by Baboo D K. Ghose, with a splendid stand of roses.

In the fruit and vegetable section, it is only necessary to say that the exhibits were not at all up to the mark, and we do not therefore enter into particulars. The season was a very unfavourable one, and so this feature is accounted for. This was admitted on all hands.

In conclusion we have only to add that this year's show was a thorough success, and the Society is to be congratulated upon the result.

Miscellaneous Items.

THE *Farmers' Review* says: The editor of the *American Dairyman*, writing of sorghum as a substitute for corn in localities where the latter is not a success, says :—

"It yields 25 to 30 bushels of seed to the acre which weighs 54 to 62 pounds to the bushel, and sells for more than corn. The tops and leaves are good either fed green or for winter dry fodder, and are regarded as better than common corn fodder, while the cows yield as much sugar and syrup as those of Louisiana, if properly handled."

That's the kind of cow we want, one that "properly handled" will yield "sugar and syrup" and we shouldn't care much if she don't give as much as those of Louisiana." If we had one we should try and develope her to give milk out of one-half her bag, and sugar and syrup out of the other. That would be the next thing to the milk and honey of the scriptures Where can we buy one of those cows, Mr. *Dairyman* ?

SWINDLES abound in all communities, and the victims are of all denominations. The farmer would appear to be particularly fair game for unprincipled scoundrelism, as will appear from the following from the *Farmers' Review* :—

The Cedar Rapids *Republican* exposes a new and big swindle which is being worked Statistical blanks are sent out to farmers requesting them to fill out on yield of crops, &c, sign their name and return to sender, stamps for paying return postage being enclosed with the blank. But after a little the signature of the farmer turns up attached to a note in the hands of "an innocent purchaser," which note, the courts decide must, be paid. This is a dangerous swindle, since the obtaining of crop reports from farmers has become so common. The U S Department of Agriculture, and that of nearly every State, send out their blanks regularly for crop reports The *Famers' Review* has its crops of crop reporters, who report weekly, and some other journals send out blanks for occasional reports. The farmer cannot be too careful to put his name to any document whatever, emanating from parties whom he does not know and have full confidence in.

EACH year a number of vegetables appear as "new," being offered in the catalogues with highly coloured descriptions. But in a few years the majority of them are quietly dropped, they having been found to be no better than the varieties already established. Our position with regard to vegetables is the same that it has long been with respect to fruits; unless a new kind has a marked superiority, in some one particular, over the varieties already in the market, it has no claims to be accepted. It is very difficult for a new pea to equal the Champion of England, but suppose a new kind equals that superb variety, yet is in no respect better, what claim has it upon us? We have no use for *two* Champions of England! It is our impression that for the past ten years more than one variety that has "come to stay," has been added to our lists each year. Still the proportion of varieties of real value, to the whole number offered, remains very small. By a perusal of the foreign journals, and consultation of the European catalogues (for strangely enough the great majority of new vegetables come from abroad), we find that but a few of those offered abroad are ever heard of in this country. Our seedsmen knew that it is of little use to offer a new Broccoli, a new Vegetable Marrow, and some others, to American gardeners, as they do not care for those things, whether old or new *American Agriculturist* for January.

SHEEP raising in Montana would appear to be very successful, as we are told that it is only ten years since the first sheep were brought into Montana, and last year the wool clip was over three million pounds. The climate gives the finest fibre to the wool, and the sheep seem hardy and healthy Last year the deaths were only two per cent in the flocks Medium, rather than very fine-woolled sheep, are considered most profitable The wool is remarkably free from burs and dirt; and the sheep are very healthy though the scab is prevalent and requires the same vigorous treatment for its eradication as elsewhere. Some hay and shelter are provided for winter. Fresh pasture is reserved for ewes in the lambing season, which comes the last of April and in May. Shearing is done without previous washing, and dipping follows shearing. In order to make a success of the sheep business here, sheepmen have found that they must put up from twenty-five to forty tons of hay for every thousand head, besides building sheds in which the animals may seek shelter during excessive cold. The hay can be put up at from two dollars to two dollars and a half per ton, and is an absolute necessity to successful sheep husbandry here The average clip in this territory is about six and one-half pounds per sheep, though isolated instances are reported of clips of twenty-five pounds

WRITING of the Angoumois grain moth, which is such a pest in nearly all parts of the world, an American exchange states that for the past fifty years, this grain moth has been spreading over the United States, and it is especially abundant and destructive in the South, the mild weather during the winter being favourable to its multiplication. In Europe it attacks rye, barley, wheat and oats, but here it not only breeds in all of the above, but also in Indian corn; in fact, it seems to prefer this to other kinds of grain. Reaumur, in his description of the insect stated that only one larva or grub attacked the same kernel, and that a "grain of wheat or barley contains the precise quantity of food necessary to nourish the larva from its birth till it is full fed." ect. All of our entomological works of recent times make the same or similar statement in regard to the habits of this pest; and however, true it may be when the insect works in barley, it is not true of its attack on Indian corn or two or more larvæ may be often found in a single grain. Perhaps it would be a benefit to the farmer if a few millions of bushels of corn, out of the billion and a half raised this year, were destroyed by insect pests, provided the loss could be evenly distributed, but as it is not at all likely that this can be arranged in this way, the safer plan will be to kill the insects wherever found.

Infested corn and other grain should be immediately ground up for feeding stock, or placed in a kiln and dried at a temperature of 200 degrees Fahr., or above it. This will quickly kill the grubs in the grain or the moths as they escape from it. The moths deposit their eggs on the dry grain after it is gathered and stored, seldom visiting the seed when the grain is ground.

Selections.

GRAFT HYBRIDS AND CRITICISM.

IN the *Farmers' Review* of November 3, we have two very interesting articles. The very valuable one by Professor Budd, on "Top grafting the plum," which will bear a few words of very gentle criticism, and the one by Mr. Hoskins on "Relation of stock to scion." If all should read Professor Budd's article understandingly, and construe it as he intended it to be construed, all would be well, but in these days when the ubiquitous and loud-tongued tree sharp is abroad in the land, falsely claiming that budded or stock-grafted trees are far superior in every way to the same varieties when root-grafted, one should be very careful not to be misunderstood when writing on the subject. Professor Budd and all other practical horticulturists know that when a half hardy variety is top-worked on an entirely hardy stock, it is hardier and generally more fruitful than when crown-budded, crown-grafted, or root-grafted; but he knows and all experts in horticulture know that a perfectly hardy variety will make a hardier and longer lived tree when properly root-grafted than it would if propagated in any other way, or at least—to put a little more mildly—equally as hardy. For instance, it would be folly to top-graft or bud the Wealthy and Wolf River apples on the Gannet or Domine, or the native plums on the European? Yet it is a fact that we can grow in perfection many half hardy fruits by top grafting them on fully hardy, vigorous stocks; and this is one of the facts that we of the West are not giving enough attention to, and if we can select such perfectly hardy variety with extra fine foliage for this climate, and well-nigh or entirely barren—the Fourth of July is such a variety of fruit itself—and then only change two-thirds or three-fourths of its top by ingrafting the fruitful sort wanted, we have got the thing about as near right as we can get it. The part of the top of the original kind, with its splendid leaves, has nothing to do but to build up and keep fully supplied with vigor and nutrition the whole tree, while the other part of its head is giving us grand crops of fruit a little better than we can get in any other way.

There are few men living, I think, who have had so great a practical experience in top-working our common fruits as the writer. The first orchard planted here by my father in 1833 consisted of 1,700 apple trees, all seedlings; these were well cared for and nearly all lived to bearing age. In the whole lot there was not one first-class apple. Many were good, a few very good, many entirely worthless, many barren. These last two classes were all changed, or top-grafted or budded sooner or later with the best varieties attainable. Later large orchards were planted with the best grafted sorts at that time to be had. Many of these proved worthless and were changed by the same processes. Much of this work was done with my own hands. Other fruits were treated in the same way. I grew up with these orchards, handled the fruit every year, made great collections of the product to be exhibited at fairs, and carried of many money first premiums, I knew every tree and where to find the finest specimens of any variety. And I invariably found them on the top-grafted trees, and especially on those strong, vigorous trees that before grafting were barren of fruit. The same was true of cherries, pears, peaches, plums and all our fruits. After watching these top grafts for over forty years, and reading our best text-books on vegetable physiology, and reading what the great Darwin wrote on the subject (and he made it one of his special studies and was inclined to think there could be no such a thing) I conclude that there can be no such thing as a

GRAFT HIGHBRED

and that the stock has not and cannot have any influence on the scion or graft so as to change the fruit in any way, except in so far as it can change it by an excessive, a superabundance or a scanty supply of nutrition, and that by this means no such wonder as half sour and half sweet, and half russett and half smooth apples can be produced, in fact it is a natural physical impossibility if the first and most prominent rudimentary principle on which the accepted facts of vegetable physiology is based is true, which is "that all growth of plants is formed by the simple division of existing cells" practically no other mode of growth is found in the vegetable kingdom. Then if a cell divides by the natural forces of growth, the two cells resulting are exactly alike, the one not a russett cell the other a Baldwin This law seems to be absolute We cannot take a cell out one-half away and then cut a half a cell from another tree and cause the two to grow together, and then have natural fission, divide this resulting cell crosswise of our artificial division. Until we can do this we can make no graft-hybrids.

But this article is already too long. I will, in a future article entitled. "The Seeming Change Made in Fruits by Top-Grafting" give what I consider the correct explanation of these curious changes,, based on natural laws and facts. For I do not dispute Mr. Haskin's facts—and will give some, very much more strange than he has recorded—but will show that he attributed them to a wrong and impossible cause as I have already done in part. The discussion of such a subject in a weekly paper may seem a little scientific for the practical man, but I hope to make my explanation very practical indeed, and the facts that I will give will have a bearing on the orchard question that may "astonish the natives."—D.B.W, in *Farmers' Review.*

KEEPING HONEY.

(BY W. Z. HUTCHINSON.)

THOSE who are not bee-keepers, and many who are, do not know under what conditions honey is best preserved. Honey when first gathered, is thin and watery, and is called nectar. The heat of the hive, aided by the manipulation of the bees, thickens and changes the nectar into honey, when it is sealed. Honey from each kind of flower has a flavour peculiar'y its own, probably imparted by a volatile oil, and the more that honey is handled or exposed to the air, the greater the opportunity for the escape of its aroma. Some bee-keepers extract honey before it is fully ripened and sealed over, and then ripen it artificially by exposure to the air, thereby allowing some of its flavor to escape. To secure first-class honey that has a rich, smooth oily, aromatic flavour, it must be ripened and sealed, by the bees, and, if allowed to remain upon the hives a few weeks after being sealed, so much the better, as bees sometimes seal honey before it is thoroughly ripened and the continued heat of the hive completes the process. After honey has reached perfection in the hive, it can be kept in that state, simply by leaving it in the comb and keeping it in a dry warm atmosphere. If extracted, it should be allowed to stand a few days in an open vessel, and, if any scum arises, it should be skimmed off when the honey may stand in some air-tight receptacle. New, clean kegs or barrels will answer, but, for storing honey in large quantities, nothing equals square tin cans, with a screw cap in the cover. These cans may be of 50 or 100 pounds capacity, and, when shipped must be encased in wood. Tin can when perfectly clean, never leaks nor taints the honey, and, if the honey crystallizes, it can be easily liquified by placing the vessel in hot water. Glass bottles or jars answer for storing honey, if they are made air-tight. Let it be remembered that it is exposure to air that causes extracted to lose its peculiar richness and causes customers to imagine that it is sugar syrup. Some kinds of honey, as bass-wood, for instance, have unpleasant strong flavours when new, and a slight exposure will tone down these aromatic qualities.

Let no one suppose that, because the honey in comb is sealed up, no care is needed in keeping it. The cappings are not entirely impervious to the air, and honey stored in a damp atmosphere will absorb water through the cappings until the honey oozes through the cappings and stands upon the surface in little drops or "beads," hence the honey is said to "sweat." When this stage is reached a slight form of fermentation often takes place. Some people put honey in a cellar; usually this is the worst place possible, as the air is cool and damp. Comb honey must be kept in a warm, dry atmosphere. In the winter it should be kept in a room in which there is a fire, or in one through which a stove pipe passes. Cold causes crystallization, and even that stored in the comb will often crystallize before it is a year old, especially so if not kept in a warm room —*Farmers' Review.*

DEHORNING STEERS—HOW IT WORKED AT THE AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF WISCONSIN.

BY PROF. W. A. HENRY.

ANY man who keeps horned cattle for the money they bring, must have wished again and again that they were hornless, especially when he comes to learn how much of the profits of the business come from keeping his animals contented and quiet.

The dehorning of cattle was begun at the experiment station almost from necessity. One Jersey bull some six years old and weighing 1,500 pounds several years ago injured his keeper, and from that day had been growing more violent, so that even with constant vigilance I found trouble. His calves were so fine that I was loth to part with him and no alternative was left but to saw off his horns or kill him. We had tried several of the devices published for restraining bulls at considerable expense, but this fellow was too old to put up with any such, and sooner or later distroyed them all. Rather than let him go to the butcher, I sent for the veterinarian, and we removed his horns after a fearful struggle. It was a new experience to all parties, and every contrivance for holding the powerful creature proved not the best. However, we succeeded, and the old fellow still lives. At the same time we operated on several calves, taking out the embryo horns with a common surgeon's knife.

It is with regard to twelve steers I wish more particularly to make mention in this article, for the reason that more satisfaction has come form dehorning these than I had deemed possible.

We had shut up two lots of six steers each in two rooms, each 22 by 26 feet, for a feeding trial They were about eighteen months old, raised on the farm, and the foreman said would do nicely together as they seemed very quiet all summer when in the pasture But as luck would have it no sooner were those fellows, that had been so quiet in pasture, shut up in a room, than they began to make each other miserable; only the bully of each bunch was at rest, and it was hooking, pushing and crowding continually, so that the weakest ones scarce dared approach the feeding trough. I could have tied each one up safely, but that was just what I did not wish to do in this particular case, and it looked as though we must abandon the original plan of conducting the feeding trial. For days they were kept in this condition with no change, unless for the worse, until as I stood watching them one day and studying, what to do next, my wrath rose as some of the stronger ones gave some extra vicious lunges at the weaker ones, wholly out of ugliness and suddenly leaving the barn I got into the buggy and drove down to the hardware store and bought a carpenter's fine saw; handing it to the foreman on my return I said, "off comes the horns of those steers," and at them we went

And now for how we did it. An ordinary stanchion was made in a room used for a bull pen; a heavy halter with a very stout strap was put on each steer and he was led to the stanchion and securely fastened. Next, the head was drawn to one side and up tight to the top of the stanchion by throwing the strap over a hook above the animal's head and two men pulling on the strap. With the new sharp fine-toothed saw held close to the animal's head, a few strokes cut off first one then the other horn and we set the creature free.

Blood flowed freely of course, each animal losing from a pint to a quart, with the average nearer the first figure. At first the foreman moved rather slowly, not knowing how to proceed, but we found by our watches that he actually sawed the horns off the last six steers in just fifteen minutes Of course we had plenty of help to catch and fasten the creatures in the stanchion. As soon as the sawing began, the steer would plunge and throw himself, and to avoid danger we placed two heavy scantlings like an X under his belly just back of his fore legs, resting the ends against the walls of the building. Mr. Haaff in his book on dehorning says, this is unnecessary, and so I think also.

"Do I think it hurt?" Why, of course it hurt, and so does castration, but we never stop this last operation on account of pain. As fast as dehorned, each steer was turned into a pasture and allowed to remain until the bleeding ceased, which was, say twenty to thirty munutes; they were then put into the barn. Before the blood had ceased running some of them were kicking up their heels and one or two of the fighters made passes at some of the more timid ones, as they had been wont to do in the stable. For three or four days they showed signs of soreness, but soon all this passed away and they settled down to business; emasculated and dehorned, what is left for them to do but to eat and grow fat?

These twelve steers are now like a lot of old Merino ewes in a pen, and I defy any man to pick out any "boss" or tell the weaker ones. Each one crowds up fearlessly to the trough, and we could as well as not keep two or three more in each room. Their gain in weight has been remarkable, and I would not for fifty dollars have the horns back again This is a plain statement of the case and not one made by an enthusiast.

There are those that hold up their hands in holy horror at dehorning, and by a few I have been called hard names and threatened with prosecution for cruelty to animals. The truth in these cases is that those who talk the loudest know the least about cattle and nothing about dehorning I believe we can save an immense amount of suffering to our stock by dehorning calves and so preventing goring and fighting in the herds and can save many human lives now lost by vicious bulls. I wrote "vicious bulls" that is wrong, for it is the "good bull" that disembowels his owner or keeper nine times out of ten. It is the owners of these "good bulls" who will show the worst rage on reading such an article as I have written, declaring "they will never be so cruel as to saw off the horns of their pet."

I have not written of dehorning dairy cows, nor given an account of how we operated on calves. On these points I do not care to write without more experience, but for bulls and steers, I can say from experience, use the saw fearlessly, sawing close to the skull; if in summer put on something like tar to keep off flies; it is winter use nothing at all. Further, don't form an adverse opinion until you have a right to do so by a study of the operation and its effects.—*Farmers' Review.*

INFLUENCE OF FORESTS ON RAINFALL.

IT is not yet known for certain that forests produce any effect on temperature or rainfall. All that can be said is that there is a strong affirmative presumption. Extensive observations have been made on the subject in Germany, but in India little has been done and our observations appear to be limited to six forest in Ajmeer, Dehra Doon, and Nahun. In some cases the observations have been regularly kept up since July, 1884, and the results are said to show an appreciably higher rainfall within the forest than without. The comparative measurements at the Ramgurh Forest, Dehra Doon, exhibit, a difference of 4 06 inches of rain in favour of the gauge placed within the forest as compared with another placed without its limits. These gauges were on the ground, another pair situated 60 feet above it showed a difference of 6 77 inches in favour of that within the forest. In the Nahun forest the differences were 0·25 and 0 09 in the two sets of observations; in the Ajmeer forests, the observation, refer only to the three comparatively rainless months of January, February, and March, 1886, but the tendency of the results is the same, namely, as showing that the existence of forests increases the rainfall. The difference in these observations are small, but this is perhaps in some measure to be accounted for by the fact that the observatories were in near proximity, not more than a quarter of a mile apart in some cases. A Russian meteorologist, Mr. A. Woeikoff, has lately taken the question up, and draws largely on India for evidence, his conclusions being similar substantially to those supported by Mr. Blanford in the last report of the Meteorological Department. Evidence confirmatory of the theory is furnished by the rainfall of the Central Provinces. The rainfall of the years subsequent to 1875, as compared with the rainfall of the years anterior to that date are found to be largely in excess, and this increase is attributed to the preservation of the provincial forests. Extensive tracts of forest previously devastated by jungle fires had been brought under protection in 1875, and thereby the area of forest growth had been much enlarged. The regions where rainfall was likely to be chiefly affected on this theory by the increased area of forest would be the districts of Badnur, Chindwara, Seoni, Mandla, Burha, Bilaspur, and Raipur, and the average rainfall for the ten years before 1875, when these localities were unprotected by forest, amounted to 49 27 inches: for the decade succeeding 1875, when they were more largely protected by forest, the average rainfall has been 55 47. These facts may not, as Mr. Blanford points out, be logically convincing, but they may at least be regarded as furnishing an addition of some importance to the accumulating evidence on the subject tending the same way. —*Englishman.*

SILK MANUFACTURE IN AMERICA.

The time when the manufacture of silk goods in the United States was of the most inconsequential proportions is within the ready recollection of the present generation, and the younger portion can easily look back to the time when silks of any kind made in this country could only be worked off under cover of a foreign brand or trade-mark. Now, however, as the *World* aptly puts it, "the United States not only produces within its own borders a very large proportion of the silk products consumed by our people, but it also makes them of so high a quality and perfect workmanship as to challenge the admiration of all foreign critics and to render it quite unnecessary for our manufacturers to sail under false colors. On the other hand, they rather court the competition of and comparison with foreign made silk goods.

The manufacture of silk goods in this country has been increasing in extent and variety for several years. In certain branches of the industry the articles made here have so completely met the needs of the home market that importations have not only almost ceased, but quite an export trade has resulted, this amounting, during the year ending June 30th of last year, to $74,610, and to the same date this year to $62,652.

Centuries have been required for the development of the silk industry of Europe. The manufacture in this country is only forty four years old and dates its earliest successes from about the year 1846 or 1847, but its best work has all been done within twenty-five years past. Though our country has, within these past twenty five years, passed through three severe financial crises, a terrible civil war and a protracted period of commercial depression great progress has been made in the art of making silk goods, and vast improvements perfected in the machinery used in our silk mills. The volume of trade has been greatly enlarged and the goods are better in every respect and of a far higher and more difficult order of manufacture.

Many causes have combined in bringing about this result. The war of the rebellion stimulated most of our manufacturing interests, by checking importations. Within the period of inflated prices (during and following the war) many new factories were built, and the facilities for manufacturing were greatly extended. Direct trade with Asia across the Pacific Ocean brought Chinese and Japanese raw silks to this market of better quality and at lower cost than before. When the 'hard times' came most of our people reduced their purchases of the more costly foreign silks. European merchants strove to meet the change by making cheaper and inferior goods; our manufacturers tried to catch trade by making better fabrics, as there was no profit in the cheaper lines. Our Centennial Exhibition helped this industry by showing to hundreds of thousands what our silk-makers were doing giving the masses a glance at the advance in silk manufacture in the United States, and it helped to develop a patriotic spirit that appreciates goods made in our own country and by our own citizens, goods at least equal to those that are imported.

Meanwhile the introduction of the power-loom has started a general improvement of the machinery employed. Our manufacturers have been much more prompt than Europeans in this matter, substituting steam-driven machinery for the handloom upon each new kind of goods as fast as they were demanded. We now make all sorts of silk fabrics on power-looms, from gossamer veiling to upholstery brocatelle, and the uniformity of goods thus made is in itself, an improvement. The workers in the mills have learned to waste less silk and perform their labor more efficiently in connection with the new machinery.

Our people are more enterprising than their foreign competitors in making changes of machinery required for novelties in style, &c , and thus meeting the demand while a fashion is at its height. Extensive alterations are made in a week or two in our mills, which changes would not be effected in as many months at Lyons, St. Etienne or Crefeldt. This enterprising haste to meet new requirements of fashion is characteristic of our manufacturers, and, not being confined to a few, results in sharp competition between them, thus keeping down the price of the goods. Owing to this competition, and the increase of the manufacture of silk goods in our country, there has been a steady decline in their cost to the consumer. Silks have never been so cheap in America as they were during the twelve months ending June 1st last. There has been a slight advance in prices during the past few months, but this is due to the increased price of the raw material and to combination of silk manufacturers in Europe.

The great benefits of the improvements in silk manufacture in America have accrued to two classes—the consumers, who have obtained better and cheaper goods and the operatives, who have had steady employment and fair wages. It is pleasant to know that the work people who have been thus benefited are of a higher class than the average. Their work is cleanly, comparatively light and is not hurtful in any way to the operative. Hence it happens that respectable parents who would object to have their children employed in other factories are glad to have them busy in the silk mills. The contrast between the laboring classes of this country and of Europe is now where more striking than in this industry.

The raw material of which silk goods are made is not produced in this country. Of the raw silk now used in manufacture in this country about 25 per cent is produced in Europe and the rest in Asia. The amount of Japanese silk sent to this market is now one-half of all the raw silk imported here. There are great facilities for handling, selling and buying raw silk in London, and that city holds a commanding position as a silk market. A portion of the Asiatic silk sent to America passes through European houses before reaching us.

The importation of raw silk into this country was in 1870 only 738,381 pounds; for the fiscal year ending June 30th 1886, it reached the commanding total of 6,785,323 pounds valued at

Judging from the amount of raw silk imported the finished goods made from it in the United States at present exceed in value $50,000,000 each year, and although such figures cannot be directly and exactly compared with those which represent the importation of European fabrics, it seems clear that of all the silk goods used in this country more than one-half (in value) is now made in our American factories.

In the year ending June 30th, 1884, the imports of manufactured silk goods had reached the high figures of $34,000,000. In each of five previous year, it had exceeded $30,000,000, Extreme dullness in trade reduced this importation to $26,000,000 for the year ending June 30th 1885. For the fiscal year ending June 30th 1886, the total importation was about the same as during the previous twelve months. We have at present an annual consumption of $20,600,000 worth of raw material (silk imported in an unmanufactured state), against an importation of $26,000,000 (invoice value, exclusive of duty, of finished foreign goods.—*Foreign Trade Gazette.*

BARRAKUR IRON WORKS.

It is so seldom that a commercial undertaking conducted by the Government attains financial success, that when such a thing does occur, it is worthy of special record. The Bengal Iron Works Company was started in 1875 with the object of working the iron field at Burrakur in the Hazaribagh district, but its success was small, and after brief career of three years the company suspended operations in 1878. The property continued in its hands, however, until 1882, when Government purchased the works for Rs. 4,30,000, and soon after placed them in charge of Ritter von Schwarz, an experienced metallist. The results since that date have been very different. Deducting all working expenses, cost of establishment, and zemindary expenditure, the aggregate net profits for the first three years that the works were under new management, amounted to Rs. 1,50,000, and the profits for the current year are estimated at something like Rs. 80,000. To put the matter in another aspect, the works have yielded about 8 per cent per annum on the capital. This result has been achieved in spite of the disadvantage that the prices of cast iron goods and the pig iron have fallen during the last ten years by 10 to 15 per cent. The chief factor in the production of these very satisfactory consequences appears undoubtedly to be the admirable management of Ritter von Schwarz, which has excelled in many features of economy and close attention to details. The late company, for example, employed 20 European workmen. besides five European engineers and a manager, altogether a staff of 26 Europeans. The European staff has now been cut down to seven, namely, four workmen, one engineer an assistant manager and a manager.

Again, great care is taken in the selection of the raw materials for the blast furnace, and the quality of the iron ore and limestone is carefully tested by continuous chemical analysis before the furnace is charged with them. The iron stone is a species of brown iron ore, and exists in great quantity in the immediate neighbourhood of the works. The cost is, on the average, 12 annas a ton delivered at the furnace. The metallic iron in the ore varies from 40 to 50 per cent, and it is, therefore, a matter of great importance that the selection of the richer kind of ore should be made. The cost of digging, transport and the working expenses remain the same, whether the ore contains 40 or 50 per cent of iron. Inferior ore is not now utilised, and the ore used contains on an average 48 per cent. of iron. The company, it is said, were content with ore containing 44 per cent of iron. Limestone exists in large quantities at a distance of 8 to 12 miles from the works, and costs from Rs. 4-8 to Rs. 5 a ton delivered free at the furnace. The present management is not content with limestone containing less than 88 per cent of carbonate of lime ; whereas it is said a percentage of 82 was regarded as an sufficient in former years. The mixture of iron ore and flux is now continually controlled in a small Deville's assay furnace, before the charges are put into the furnace. This precaution appears to have been neglected formerly and the consequence was that the furnace rapidly deteriorated, involving great expense in its re-construction. The first furnace established at the works for the season was "gobbled up" after working for only a few months ; a second was burned out after being in operation for ten months. The furnace constructed by Ritter von Schwarz has been in use for three years, and is still in working order. Another economy has been the reduction of the zemindary expenses from Rs. 11,500 to Rs. 8,000 a year. This has been effected by cancelling certain valueless leases. The consequence of the present economical management is that the works are enabled to put their products into the market at a very low rate. Moderate prices are a characteristic feature of the manufactures. The principal articles which the works at present turn out are such things as cast iron pipes, cylinders, and screwpiles, railway sleepers and chairs axleboxes for railway wagons, ornamental castings, and agricultural implements. The works are at present unprovided with the requisite appliances for the manufacture of pig iron and castings on the most modern principle, and when these are introduced a further reduction in the price of its manufactures will no doubt be effected. The Government may well be congratulated on the success of the works under its supevision; but it is obviously desirable that the works, being now established on a firm commercial basis should be disposed of at as early a date as is possible to private hands. It is no part of the duty of Government to set up as dealers in pig iron and iron castings, and it should be satisfied with having fostered a moribund industry into vigorous life.—*Englishman.*

STRANGE REMEDIES.

(BY A PHYSICIAN.)

ONE whose walks of life are much among the sick, runs across some strange cases of indigestion now and then, cured by quite exceptional remedies. Probably there is no complaint more common than dyspepsia, and yet the physician has no infallible rule by which he can say that a certain remedy will cure a certain case. The result is that the victim of this affection is constantly on the alert for some remedy which will relieve his sufferings and afford a cure.

In the early years of his practice the writer was called upon to see a young lady who was suffering from dyspepsia. She was a brunette, with brown eyes, a healthy, strong physique, but was somewhat nervous. There was nothing specially unusual in her train of symptoms, the principal one of which was pain and nausea without vomiting. She was given acids, aromatics, charcoal, &c., but to no purpose. She went the rounds of the doctors in the neighbourhood, but without material benefit. One day the young lady met me, and exclaimed—"Doctor, I'm cured; and what do you think cured me?" I tried in vain to guess, and finally she told me—"hard cider." I have since known other cases similarly cured, but can only say that I believe the *taste* will be the surest indication of its usefulness.

Another strange remedy for dyspepsia is raisins. These have been recommended by housewives for no one knows how long. What was the origin of the custom of eating raisins and nuts at dinner, we cannot say. Certainly the nuts are not digestive agents. The acid in the raisin is pronounced by dyspeptics to be very grateful indeed, and there can be little doubt, we think, that *raisins* are often of great value to dyspeptics.

A strange remedy which we have known to cure many a case of dyspepsia is chewing spruce gum. We do not know that this has ever been mentioned by medical writers, or an explanation of its usefulness offered. Yet a valuable remedy it is in certain cases The explanation is this:—

As the saliva acts on starch, and the gastric juice only on albumens (like meat, white of egg, gluten, &c.) when the food is bolted, or quickly swallowed, with tea or water, instead of being properly masticated and diluted with the secretions of the mouth, the starchy matters are not converted as they should be. The saliva has had no chance to perform its offices in the mouth and in the stomach. The result is that the starchy food which might otherwise have been absorbed by the veins of the stomach, may roll about in that organ for hours to irritate and disturb it. Chewing gum often compensate for the evil. How? Not by any therapeutic properties of the gum; not at all But by its mechanical presence in the mouth, a flow of saliva is evoked; this is swallowed, and may effect some digestive action in the stomach. That starch is a common cause of dyspepsia, especially among tea-drinkers, who eat too much bread, and among those who eat quickly, stands to reason.

The last strange remedy we shall mention is the ferment. That it should be possible to take a stomach, extract the something which digests, and put it in a bottle, and make it do our own digestion months afterwards is strange enough. Yet this is the case precisely; and the digestive ferments thus extracted constitute a great advance in medicine. Chemists now take a pancreas (abdominal sweet-bread), extract from it the ferments which act on various foods, and perform the most complete artificial digestion ever known, This affords a scientific line of treatment, and to be commended. It supplies the dyspeptic with exactly what he wants A very excellent preparation of the pancreatic ferment is Zymine [*Extractum Pancreatis*] —Fairchild. It is most active and the best way for dyspeptics to take it is in tabloids, each of which contains three grains. They often relieve indigestion at once, and their action may be relied on.

SHRINKAGE AND LOSS OF HAY IN STACKS.

PROFESSOR SANBORN, of the Missouri Agricultural College, treats of the above subject in a recently published bulletin as follows :—

Against my conviction that stacking hay is not an economical method of preserving it. I am forced to stack it in the open air according to the prevailing practice.

Hay contains in the dry, as well as in the green state, matter that is soluble in water. For this reason all exposed hay on the exterior of stacks is subject to having washed from it such soluble matter. In round stacks the amount of hay thus exposed is much larger than is usually supposed. A body one foot in diameter contains only one-fourth the matter that a body two feet in diameter does. Thus six inches from the circumference toward the centre will contain four times as much matter as the central part of a round body, two feet in diameter will contain.

A stack of hay, twelve feet in diameter, and six feet to the point of its drawing in, and five feet more to the top of its cone, will contain on its outside foot, at 450 feet to the ton, 286·57lbs of hay, while the interior will contain 58049lbs. Thus, 33 per cent of the hay of the ordinary round stacks of the State is found on the outside foot of those stacks.

A heavy proportion of this food is obviously subject to loss by leaching rains, by moulding and by actual rotting in badly constructed stacks. It was said by one who handled hay during last year that one-half of the hay of his county was so damaged as to be virtually worthless.

August 9th 1884, I have put up a well-made stack of second crop of clover. It was in good style to shed rain and capped with other material. It was built over rails laid down as a foundation and all done up in about the usual style, save that it was perhaps a little below the ordinary size. Notwithstanding this fact it was not injured internally by water as we often see in poorly made stacks. It weighed August 9th on stacking 6,514lbs. It was tested for water content by the water bath and found to contain 32 5 per cent of water. March 3rd it was again all weighed with much care to prevent loss of hay in handling. Its weight was 4,548lbs. At this time it contained 16 14 per cent of water. The change in water content is quite noticeable and places us as was anticipated unde the necessity of ascertaining the dry matter of the hay, both in the fall and in the spring.

6,514lbs less 32 5 per cent water is 4,397lbs. 4,548lbs less, 16 14 per cent water is 3,814lbs. Loss of organic matter untill March 23·583 lbs per cent loss for 7½ months, 13 2.

What would have been the loss from July 1st, until May, when the last of winter food is supposed to be fed ?

Before drawing any conclusion, I wish to say that this is not sure to represent an average truth, yet at the same time the sampling of the hay was carefully made for water content.

First the 6,574 lbs. of hay in the fall would have been as well sold at $5 a ton as the 4548 lbs. at $7·16 a ton in the spring. This does not include interest and cost of handling which would carry the spring cost up to $8 per ton to equall the $5 fall price.

These figures, of course, contemplate the sale of the hay direct from the field.

Second, the above figures of shrinkage for the stack in question do not include the injury to the hay on the bottom of the stack and the direct injury at other parts.

Third, the 13 2 per cent lost was doubtless mainly from its more valuable portions ; those portions that would be more easily digested leaving all of the exterior of the stack off in aroma, available sugar, and richer in ratio of woody fibre. Hence it would be eaten less readily, digested more poorly, and would give less growth, and white, and more poorly flavoured butter.

Fourth, this 13·2 per cent when applied to 100 tons of hay means a loss of 13 2 tons. This, at $6 per ton, which sum is less than the average price per ton of hay, as returned to this office for every county of the State, gives a money loss of $79·20. This sum is the interest on $1,320 at 6 per cent. For $1·320 a barn could be constructed in which water will not freeze, and that will hold 100 tons of hay and cattle enough to consume it.

In this estimate it will be observed that I have made no claims for damage to hay otherwise than in loss of weight. I do not reckon this, for I am aware that loss may possibly occur under shelter and that I may have in this trial more than an average necessary loss. I am sure that I have much less loss than that usually received.

SUGGESTIONS.

Experience and observation assure me that our lose from badly stacked hay is enormous and not in the interests of economy.

I would advise a moderately expensive barn. This saves the hay trampled out about stacks ; it saves the mature ; it decreases the amount of food eaten ; it saves the lives of animals and the loss of hay from sources above considered. I am thoroughly satisfied that the above losses are the interest on very much more than the cost of a good barn.

To those who cannot secure barns, a cheap and successful system may be found in building broad, square, high stacks and covering them with boards ; a double layer of boards being used to cover the joints. The English thatching and other systems of covering are often available. Some one method or methods should have universal adoption.—*Farmers' Review.*

THE FUTURE OF QUININE.

FROM AN AMERICAN POINT OF VIEW.

A WELL INFORMED American correspondent sends us the following :—There are some points in connection with the position and prospects of quinine which deserve attention at the present time. A most important feature is the very heavy increase in the consumption in the United States. The import statistics being very accurately kept, it is an easy matter to arrive at the exact quantity received from abroad. It is a pity such statistics are not also forthcoming from Europe, where most assuredly a large increase must also have taken place. On Europe falls the task of supplying the new markets which have lately been opened up in Africa, Asia, and Australasia ; these will absorb increasing quantities in the future. The exact quantity of sulphate of quinine entered at the port of New York during 1886 was 1,500,000 oz. The produce of the American manufacturers must be taken at 1,200,000 oz., and to these totals will have to be added the quantities imported at the ports of Philadelphia, Boston, Baltimore, and New Orleans. The returns from these places have not yet been received, but may be safely computed at 300,000 oz., thus bringing the total consumption of the United States up to 3 million oz., or 20 per cent over that of 1885. Presuming that the consumption has increased in the same ratio in other countries as in the United States, it is safe to suppose that with 3 million oz in the States, the world's consumption now reaches between 5½ and millions annually. It is also a matter of considerable importance that in spite of the enormous exports of cinchona bark from Ceylon and Java during the year 1886, the stocks at the close in all the bark markets of Europe and America taken together are in the number of bales and weight of contents within few hundred thousand lbs. of the stocks at the same period the previous year. This alone shows that there must have been a greatly enlarged outlet for the manufactured article, as practically nearl the whole of the bark received during the year must have been used up and got rid of as quinine. The low prices prevailing for bark in Ceylon for the last six months have greatly contracted the shipments, the quantity exported since October 1st being 1,100,000 lbs. less than the same period in 1885. The total stock of cinchona bark at the end of 1886 in London, Paris Amsterdam and New Yorkly is repreated be 62,000 bales or, equal to about 2,000,000 oz. of sulphate of quinine. This, with the increased consumption induced by low prices and new markets, is equal to about four months' supply, shewing conclusively that the position of the article is improving every day. It is said that the stock of the manufactured article is excessive but speaking for the New York market it can safely be said the available stock is not larger than last year. The control of the sulphate of quinine used in the United States has gradually centred in the hands of a few firms in in New York and Philadelphia ; and this country being the largest consumer, the future of the quinine business will be more or less in the hands of American houses.

At present the market is slow and uninteresting. Few transactions are reported and those of a jobbing nature. Consumers and small dealers have lost faith in the article, and do not carry anything like the stocks they used to do. It is a fact that low prices do not appear to attract them ; at any rate according to the custom of this market they will wait till an upward movement is firmly established before they begin to buy for more than immediate wants.—*Chemist and Druggist.*

THE OLEOMARGDRINE LAW.

OFFICIALS of the department of internal revenue estimate that the revenue receipts from oleomargarine licenses and tax will exceed one million dollars per annum and may reach a million and a half dollars. From this it is argued that the sale instead of being diminished by the law will be increased, the Government stamp on the package being a guarantee of its purity. It is no such guarantee. All that it guarantees is that it is a mixture, not genuine butter.

It must be borne in mind that the manufacturers have made tremendous efforts to boom their goods under the law. They have induced every dealer they could influence to take out license, and it is reported that in many cases, they have themselves paid the licenses for the retail dealers, so that the license receipts for the first year are by no means an indication of what they will hereafter be. Not many people will buy oleomargarine instead of butter (unless it be hotel, boarding house, and restaurant keepers) when both are sold in their true character. Many retail dealers will find that the profits from oleomargarine will not warrant the payment of a yearly license of $48; especially as now selling in its true character, it must sell a good deal below what it did when sold as genuine butter. So that it is probable that many licenses taken out this year will not be renewed, especially as retailers will find that the sale of the bogus goods alongside of the genuine gives offence to their best customers. Admitting, which we by no means do that oleomargarine is in the future to be the choice of the common people in place of butter, and that the dairy farmer is to derive no advantage from it, the law will accomplish at least this good. It will enable those who want to buy oleomargarine to get it at a reasonable price instead of paying, as heretofore, the price of genuine butter. It is now being quoted openly in the markets, ranging in price 30 to 40 per cent below butter. Thus in the Boston markets, recent quotations of best dairy butter were 24 to 25 cents and of best oleomargarine 17 cents. But for the law it would all have passed as genuine butter, and at the same price.

Under the law, as it now stands, the manufacture and sale of oleomargarine is a legitimate business in either a moral or legal sense. When sold as butter it was a fraud and crime. If the dairy interests of the country cannot stand the competition which it will bring under the law, they will have to submit with the best grace possible. No one need delude himself with the idea that the prohibition of its manufacture and sale can ever be brought about, though a prohibition of its manufacture and sale in imitation of butter coloured like it, might be brought about as also an amendment to the law compelling it to be put up and sold in a package pecuarly its own, and which shall indicate its character, as a law of Denmark requires it to be put up in oval instead of round tubs. A year from now we can, be much better able to tell of the practical workings of the law, than we now can through our foresight. In the meantime we have no idea that the law is going to any great degree, disappoint the expectations of those who demanded its enactment.—*Farmers' Review.*

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 16TH FEBRUARY 1887]

Madras.—General prospects tolerable.

Bombay.—Reaping operations going on in six districts. Standing crops damaged by frost in parts of Gujerat, and by blight in parts of the Deccan and Dharwar. Fever and cattle-disease in parts of eight and ten districts respectively, and small-pox in parts of one district.

Bengal.—No rain. Weather cold and clear. *Rabi* crops generally promising. Mustard and pulses are being gathered with good outturn. Sugarcane is being cut and crushed. Poppy doing well in North Ganges districts, but is late and has suffered from caterpillars in South Ganges districts. *Boro* rice is planted out. Ploughing for *aus* rice and jute is in progress. Public health is generally good.

N.-W. Provinces and Oudh.—Weather clear. Injury has been caused to crops in several districts from frost and blight. *Rabi* prospects continue, however, to be favourable. Markets are well supplied, and prices generally steady. Public health good.

Punjab.—Rain is wanted in all districts, except Delhi, Umballa, Rawul Pindee, and Dehra Ismail Khan. General health good. Prices rising, except in Mooltan, where they are stationary. In Shahpore, where they are high, and in Peshawur, where they are fluctuating. In Shahpore crops are suffering from want of rain. Elsewhere prospects are good.

Central Provinces.—Weather clear but getting warm. Wheat and linseed have been slightly damaged in Northern districts by frost and blight. Fever and cattle-disease in places. Prices rather higher in some districts.

Burmah.—Except for a few cases of cholera in Akyab and Pegu districts, public health in Lower Burmah good. Health of cattle good. Reports received from Shwebo and Yemethen districts in Upper Burmah. State of public health good. Food-supply sufficient.

Assam.—Weather seasonable. Gathering of mustard finished. Crushing of sugarcane and ploughing of land for *ahu* in progress Cultivation of *dumai* crops commenced. State and prospects of the crops good. Cattle-disease prevalent in Ratabari outpost. Health good. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Prospects of season continue favourable. Public health generally good. No material change in prices, which, however, show a tendency to fall.

Berar and Hyderabad.—*Tabi* crops prospering. Harvesting of gram, white *juar* and wheat crops commenced. *Rabi* crops doing well. General health fair. Fever disappeared. Prices steady.

Central India States.—Easterly breezes. Weather getting warm. *Arhar* and opium fields much damaged by frost, in several places. Prospects are therefore not quite favourable. *Rabi* prospects fair. Health Good. Prices steady generally.

Rajpootana.—Weather getting warmer; week almost rainless; tanks and wells drying in most places. Crops, especially opium and gram, damaged to some extent by frost, but prospects continue favourable. General health good; cattle disease in some parts of Marwar. Prices show an upward tendency.

Nepal.—Cold, frosty weather. Prospects fair. Prices high.

Letters to the Editor.

CRUDE SALTPETRE.

TO THE EDITOR.

SIR,—Will you or any of your numerous readers kindly let me know whether *crude* saltpetre can be procured in Calcutta. If so, from where, and at what price.

J. C. ROSTAN.

Calcutta, February 14, 1887.

AVENUES ON DISTRICT ROADS.

TO THE EDITOR.

SIR,—Referring to the letter on "Avenues on District Roads" appearing in the issue of your paper dated 1st April 1879, page 139, I shall feel greatly obliged if you will be good enough to inform me whether any great extent of the roadsides in India have been so cultivated; and if so, the number of miles so cultivated, the aggregate number of trees and plants now growing, the system of cultivation, whether by day labour or otherwise, the average expenditure on each tree till maturity, and the average estimated profit to Government on each tree at felling.

CHAS. STOUTER,
Audit Office, Colombo, Ceylon.

January 30, 1887.

NOTE,—This is rather an extensive enquiry, requiring much time and trouble. We shall do what we can in a future issue to supply the information to some extent; meanwhile some of our readers might help our correspondent.—ED., *I. A.*

THE MANGO PEST.

TO THE EDITOR.

SIR,—In supporting the suggestions put forward by Baboo Shoshee Bhoosun Biswas, I beg to say that something should be done either by the amateur *savants* of our country, or a Government investigation into the causes that have brought about the spread of this mango pest, particularly in this part of the country. Our Agri-Horticultural Society might take up this matter in hand. Indeed it would be a great boon to the people if anyone would suggest some preventive measures, or means to destroy this insect. It is now time to commence investigations, otherwise it will be very difficult later on when the crop will be in an advanced stage. From the nature of the insects found in the fruit last year, I suppose them to be of the *Hymenopterous* species, I take it that the pest has its origin in the ovary when the tree is in full bloom. The eggs attain maturity simultaneously with the mangoes and come to life from the pupa state as the fruit ripens.

As a preventive measure, I beg to suggest that bonfires should be lighted in every garden in close proximity of the trees in the evening. A little crude sulphur might with advantage be added to this fire. One point must be noted, *viz.*, that the fire should be made so as the wind may carry the smoke towards the trees without any difficulty. This process should be repeated till the young fruits set, when the trees might be syringed with a solution of phenyle and water at regular intervals of from 15 to 20 days till the fruits ripen.

H. MITRA.

Gurpar, Calcutta, February 14, 1887.

Editorial Notes.

A POONA correspondent telegraphed on the 18th instant:—"The cattle and poultry shows opened without formal ceremony. So far as the cattle are concerned it was not a goodly exhibition, and there were poor entries. An interesting feature was a steam threshing machine which worked during the show, and is capable of threshing 270 Bengal maunds in eight hours. The poultry show was a success, the English poultry being remarkably fine. Lady Brassey contributed a few buff Cochin Chinas." This is certainly very meagre information, especially about the steam threshing machine. It is not stated what grain it is intended to thresh.

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THE report on the prospects of the Burmah rice crop up to 31st January 1887, is as follows:—"The total area under rice cultivation in the ten surplus rice districts is now (31st January 1887) reported as 3,310,320 acres, or 18 200 acres less than last month's estimate. The estimate of the outturn then reported is confirmed, except in Hanthawaddy and Pegu, where it is reduced by 8 200 and 10 000 acres, respectively. The fallow area in Hanthawaddy is increased by 6,515 acres higher than last month's estimate. Harvest operations are everywhere well advanced and the outturn of grain is satisfactory, except in parts of the Bassein district. The harvest has been uninterrupted by disturbances, and the estimated exportable surplus remains 1,100,000 tons.

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A CORRESPONDENT of one of the Madras papers makes a really valuable suggestion as to the commemoration of the Jubilee. He would have an 'arbour day' proclaimed throughout India on the 20th June next, when trees and topes should be planted throughout the Empire in commemoration of the event. At the end of ten years, 500,000 acres might be covered with trees, which should prove not only a source of revenue, but a great philanthropic investment for the well-being of succeeding generations. If by a little wise influence the municipalities of the country generally could be interested in such a movement, there is no limit to the advantages that might be secured thereby.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 16th February 1887:—Except in five districts of Madras where slight showers occurred, the week under report has been rainless. The early *rabi* harvest continues in Bombay and Bengal, and has also commenced in Hyderabad. In other provinces the prospects of the standing crops are very favourable, though injury from the prevalence of frost and blight is still reported in parts of Bombay, the North-Western Provinces and Oudh, the Central Provinces, Central India and Rajpootana In the Punjab the want of rain is felt in most districts. In Madras the standing crops have been affected by disease in three districts, and rain is generally needed. In Mysore and Coorg agricultural prospects are satisfactory. The transplanting of the spring rice has been completed in Bengal, and ploughing for the early rice crop has commenced. In Burmah the rice harvest is over and threshing is in progress. The cutting and pressing of sugarcane continues in Bengal, the Central Provinces and Assam In Bengal and Assam mustard is being gathered. Poppy continues to thrive in the North-Western Provinces and Oudh, but the plant is late in Bengal and has suffered from the ravages of caterpillars in the South Ganges districts. In Central India and Rajpootana the plant has been affected by frost. The public health continues generally satisfactory. Prices are still rising in the Punjab and in some States in the Rajpootana Agency. In Coorg they are falling, and elsewhere are generally steady.

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To the question: "Is air necessary for the germination of seeds?" a home contemporary replies as follows:—"Scheele has shown that air, or rather oxygen, is necessary for germination. Seeds deeply buried in the soil, and excluded from air, do not spring. Buried deeply in the soil, seeds sometime lie dormant for a long time, and only germinate when the air is admitted by the process of subsoil ploughing, or other agricultural operations. When ground is turned up for the first time, it is common to see a crop of white clover and other plants spring up which had not been previously seen in the locality. After the great fire in London, plants sprung up, the seeds of which must have long lain dormant; and the same thing is observed after the burning of forests, and the draining of marshes. Mr. Vernon Harcourt mentions a case where turnip seeds lay in a dormant state for seven or eight years in consequence of being carried down to a great depth in the soil. Mr. Kemp mentions the germinations of seeds found at the bottom of a sand-pit twenty-five feet deep, which he concludes to have been deposited more than 2,000 years ago."

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ANOTHER contemporary observes that the competition from wheats sent from Asia Minor is greatly lessened by the lack of economic means to take the produce of that country to the nearest seaboards. The "hopeless condition" of the agriculturists there is the subject-matter of an American Consular report, from which a few facts may be taken. In the district of Castamoni wheat is worth only 4*d*. per bushel, while in England the average price is about 4*s*. per bushel, or just twelve times as much. Were there a railway, this wheat could be carried to the sea-board—a distance of 150 miles—for about 6*d*. per bushel. The other charges at the highest would be as follows:—From the Black Sea to England, 7½*d*.; selling charges in England, 4½*d*.; and for charges in Asia Minor, 4½*d*. Thus, if there were railway transport, wheat in Asia Minor would be worth from 2*s*. to 2*s*. 3*d*. per bushel, instead of only 4*d*. per bushel, or a rise of five-sixths in value to the grower. As it is, all the produce has to be sent by ox-carts at very great expense, the result being that, with present low prices of wheat in England, the production of wheat is absolutely ruinous.

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THE Indigo season which has just come to a close, has been a remarkable one in some respects. The opening of the season was rather dull, except for plant Oudhs, which were unusually good. Bengal and Tirhoot marks were also very good, but were in little demand. The biddings at the auctions were languid, and prices fell until about the middle of January, when rates returned to about the same as at the beginning of the season, with the exception of those for the best indigo, which having fallen about Rs. 20, only recovered to the extent of Rs. 5 per maund. A distinguishing feature of the season has been the large demand from America, which has taken about 10,000 chests including nearly all the Oudhs, and more than the average quantity of good, "colory" Bengal and Tirhoot sorts. Russia, contrary to the usual custom, took very little of the best marks, which may account for the decline in their prices. France has taken about the usual quantity, Germany much less than usual, but buyers have taken more for London than was expected owing to the low rates ruling for the middling and better sorts. The general decline in prices is attributed to the largely increased production of indigo in Java, for which low prices ruled, and from which the requirements in Holland were chiefly supplied. Regarding the quality of the crop, it it is stated that many of the Bengal marks were decidedly inferior, and some even below the average, but that those from Purneah and Bhaugulpore were of an average quality. The produce of Behar, especially of Chupra, was certainly above the average, but that of Benares was inferior, while the plant Oudhs were far above the average.

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THE Burman pony is a wonderful little animal, particularly in his own country. A paper recently contributed by V. S. J. H. Steel to the *Veterinary Journal* says:—"The Burman pony has long been known in India as the Pegu, but at present there are at least three kinds to be obtained in the market. Of these, the first is the *Shan* pony, periodically brought down by his owners from the table-lands of the State between Burmah and Siam. They are of sizes ranging to a little over twelve hands, very variable in colour and also in physique. The most peculiar, those pointed out as true, pure-bred Shans, attracted my attention at once, *as being perfect little cart horses*, with Roman noses, intelligent expression, stout necks, low withers; upright, straight forelegs, with short pasterns, large hairy fetlocks, and wide, open flat feet; chests of most extraordinary breadth, round barrels, goose rumps, the tail on very low down, and short thick hocks. These cart-horse-like ponies are highly valued as weight carriers, and fetch a high price in the Rangoon and Moulmein markets, but less admirably made ponies are the rule, and may be had at moderate prices, especia-

at the latter place. The second kind of pony is the *Mandalay* He is altogether a lighter and rather larger animal, with a certain touch of Eastern blood probably derived in times past from chargers presented by European adventurers to the king or nobles of Burmah as an acceptable form of donation. He is well-made and handsome, well suited for harness or riding purposes, with very good trotting power and excellent constitution. The *half-breed* is the third variety. He is got by Government stallions out of country pony mares, and proves much faster than the pure native animal—so much so that it has been found necessary to protect the latter by the formation of a Burmah Turf Club, and the establishing of regulations as to terms of running for ponies according to caste. The pony breeding operations are under the supervision of Mr. Frost. The half-breed fetch good prices, and are much appreciated by a large section of the Rangoon community ; but there is another and large party which considers that the ponies in Burmah are now less robust for work and sturdy in constitution than formerly."

The authoities of the Royal Gardens, Kew have made a 'new departure,' as the following announcement will show :—" It is proposed to issue from time to time, as an occasional publication, notes too detailed for the annual report, on economic products and plants to which the attention of the staff of the Royal Gardens has been drawn in the course of ordinary correspondence or which have been made the subject of particular study at Kew. It is hoped that while these notes will serve the purpose of an expedicious mode of communication to the numerous correspondents of Kew in distant parts of the Empire, they may also be of service to members of the general public interested in planting or agricultural business in India and the colonies. W. T. Thiselton Dyer, Director." The 'occasional publication' refered to is called the *Bulletin of Miscellaneous Information*, and was issued simultaneously with the above announcement. According to the *Gardeners' Chronicle*, [we have not seen the *Bulletin* yet,] " two subjects are mentioned in this *Bulletin*—*teff*, and oil of Ben. *Teff* is a cereal largely grown in the mountains of Abyssinia, and is the produce of a grass, *Eragrostis abyssinica* In answer to inquiries the Director publishes extracts from the works of Richard and Bruce giving particulars of the nature and mode of cultivation of the plant, and also extracts from correspondence with the Foreign Office, various Consuls, &c. As a result of these inquiries seed has been sent to Kew and analysis made by Professor Church who notes that the grain contains 8 2 per cent of albuminoids (flesh-forming food), and 68 1 per cent of starch (or force-producing food). Oil of Ben appears from documents before us to be a sort of botanical " Mrs. 'Arris." "El Ben," we are told, is the Arabic or Persian name for *Moringa pterygosperma*, but the oil prepared from the seed of this plant in the West Indies is of no value, perhaps on account of some defect in its preparation. The *Bulletin* before us affords an indication of one phase of work done at Kew, of which the general public knows little or nothing, but which, nevertheless, is of first rate importance. In a subsequent issue it may be found desirable to curtail the space given to mere formal official correspondence."

We have received the prospectus of the British Borneo Trading and Planting Company, the capital of which is placed at £100,000, in £1 shares (offices 12 Finsbury Pavement, London). The company has been formed for the purpose of carrying on the business of merchants, agents and planters in, and with British North Borneo, and of acquiring a concession of 20,000 acres of land granted by the Government of that colony for 999 years free of quit rent, and conveniently situated for the purposes of the company in the neighbourhood of Sandakan, the capital. As proof of the scope which trading possibilities offer, it may be mentioned that since the assumption of the Government of the country by the British North Borneo Company the imports and exports have increased in value as follows :—

	Imports.	Exports.	Total
1881	$ 160,658	$ 145,444	$ 306,102
1885	$ 645,529	$ 501,641	$ 1,047,240

but the British North Borneo Company being a purely administrative one, the trade has been left in the hands of the Malays and Chinese, and has been carried on chiefly between the ports of Singapore and Hong-Kong. It is the intention of this company to introduce a direct import and export trade with the European markets—both on its own account and as agents—making advances of money, where necessary, against bills of lading and other approving security. Planting enterprise is said to be very favourable and labour is cheap and plentiful ; Malays can be hired at from $ 7 to $ 9 per month, while a further supply of cheap labour fitted to the climate can be had in the overflowing population of China within five days' steam. The climate is salubrious, and the health of the Europeans in Sandakan is exceptionally good. There is an even and regular rainfall but a complete absence of cyclones and earthquakes, even thunderstorms being uncommon.

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The following is a summary of 'Messrs. Wm. Jas. and Hy. Thomson's fortnightly circular of Indian tea, dated London 20th January 1887 :—About 69,600 packages have been offered, during the fortnight 62,000 of these being tea of fresh import, 2.500 second-hand parcels, and 5,100 from Ceylon. Steady demand from the country and good daily deliveries have imparted a feeling of confidence to the buyers, and the biddings have been brisk for nearly all descriptions ; but present and prospective supplies are sufficiently ample to retard recovery in prices and with few exceptions, quotations remain unchanged. Good qualities of Pekoe Souchong and Pekoe are dearer, and for fine Darjeeling teas of all grades improved prices are obtainable, owing to their scarcity; but, on the other hand, for Broken Pekoes and Broken teas with mixed leaf or inferior liquor rates are irregular, and for the most part somewhat lower. A few teas with brisk autumn flavour have sold readily, and at better quotations than earlier invoices from the same gardens. Telegraphic advices from Calcutta state that the shipments to the 15th instant were about 67 million lbs.(10 millions more than last season—the London sales to date being about 6 millions in advance of last year) and that the shipping season is drawing to a close. Our friends also inform us by wire that there continues to be a marked deficiency of good and fine tea, the bulk of invoices being low grades, and Broken teas : the latter classes, we may point out, at the present prices are going freely into consumption, as their value is considered by the trade to compare favourably with that of common China Congou, for which rates show no sign of falling to a price which would lower the value of Indian tea At the Calcutta sales held on the 13th instant comprising about 12,000 packages, common to medium Pekoes were dearer, and other sorts unchanged, the average realized being 7 annas, equal to about 9¾*d*. average in London. To-day about 10,000 packages are being offered.

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Writing on the subject of Abyssinian economic plants, the *Journal of the Society of Arts* says :—" Among the vegetable articles of diet of the Abyssinians, the first place is taken by *teff*, *Poa abyssinica*, [*Erogrostis abyssinica*?] a herbaceous plant, whose grains are as small as a pin's head ; the meal from this forms the bread in general use. A much inferior black bread used by the poor is made from a kind of millet called *tocuso* (*Eleusine Tocuso*), frequenting the low grounds. In addition, the roasted seed of the flax plant (*Linum usitatissimum*) is sometimes eaten, as it was by the ancient Romans and Greeks. Another admired vegetable is the flower stalk of the local plantain, called *ensete* (*Musa Ensete*), the fruit of which is dry and unfit for eating. The stem is cooked with milk and butter. It is cut off just above the *rootlets*, and about two feet high if old, the green outer coat is peeled off till the white interior shows. It is as tender as a well cooked turnip, with a flavour like the best new bread somewhat underdone. It is an excellent dish, nourishing, wholesome, and digestible. From meal cakes a fermented drink called *bousa* is made. The coffee grown in Abyssinia is principally sent to Djedda and Upper Egypt ; though not of first rate quality, it possesses a special aroma, and is sold at the rate of 16 dollars per *cantaro* of 113 *rottoli* (say 37*s*. per cwt.) The women of Gurage make mats of the leaves of the *ensete*. The *ecca* of the Abyssinians, a species of *asclepiad*, produces a tough fibre, used in making cordage and tissues on the Red Sea littoral. The bark of *calotropis gigantea* affords excellent fibre used for various purposes. The tender leaves newly pulled from the stipa of the *doum* palm are woven into all

kinds of matting and basket ware. The powdered seed of a large tree called *berebera* (*Milettia ferruginea*) is thrown into the water to stupefy fish and facilitate their capture. The native dress consists of a large folding mantle and close-fitting drawers. The houses are rude conical structures covered with thatch. Among the local products figuring in the exports are :—Calves' hides, salted and sun dried ; beeswax, chiefly from Gedaref ; ivory, tamarinds, ostrich feathers, gutta-percha, from Kassala ; gum arabic, mother-of-pearl, leopard skins, about 1,000 annually to India ; musk, contained in bulls' horns, to the number of 200 to 300 a year ; honey, and tobacco, chiefly from Sanaaid."

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THE idea prevalent that excessive cold is destructive to insect life is erroneous : so writes Mr. McLachlan to the *Gardner's Chronicle*, and in explanation of this he says :—" No rule is without its exceptions, and there are probably cases in which severe frost is really fatal to insects ; but in the majority of instances and especially in the case of larvæ that habitually 'live,' through the winter the cold, if continued without intervals of excessive moisture, is favourable. Larvæ may be frozen to such an extent as to render them brittle as rotten sticks, in which condition they can scarcely be said to 'live,' but on the return of warm weather they revive not a bit the worse for their freezing. Amateur breeders of insects always experience difficulty with larvæ that hybernate, and almost their only chance of success is to leave them out-of-doors exposed to all the vicissitudes of weather, and even that plan is not always successful, because there are usually certain artificial conditions called into service in order to prevent their escape when they rouse up. The great enemy to insects in winter is excessive moisture ; it induces attacks from 'mildew' which probably destroys more hybernating insects than all the rest of the contingencies put together, and it also directly causes death by drowning. The water enters into the breathing tubes through the spiracles, or external openings, and acts in precisely the same manner as too long continued submersion n a lung-breathing animal. Continued hard frost is favourable (as a rule) to insect life in winter. A mild open winter is usually unfavourable, because it is generally connected with excessive moisture. Probably the most unfavorable of all, is a winter in which periods of great cold and unusual warmth alternate. That cold is not detrimental is evident from the fact that butterflies and humble-bees (not to mention others) occur nearly as near to the North Pole as any Arctic expedition has yet approached ; and it is probable that these may occasionally be forced to remain in a frozen state during two or three consecutive years as eggs, larvæ or pupæ. In latitudes a little lower, swarms of gnats, &c., emerge actually from the ice when the spring thaw occurs in which ice they have been embedded for months as pupæ. Horticulturists and agriculturists should endeavour to get rid of the old-fashioned idea that a hard winter is generally unfavorable to insect-life."

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WHEAT growing in France appears to be making very satisfactory progress. The various experiments made last with a view to obtaining extra heavy crops, appear to have been very satisfactory according to the results which have come to hand (says the *Field*). Two of the most interesting were conducted by two large farmers in the Department of the Haute-Saone, upon the frontier of Switzerland. One of them, M. Victor Beauquis of Valleguindry, made his experiments with shiriff and red Scotch wheats, and he obtained 40 bushels of grain and 7 tons of straw per acre with the one, and 38 bushels of grain and 6½ tons of straw with the other. M. Waltefangle of Chargez-les-Gray tried five varieties of wheat, and he succeeded best with the square-headed wheat, 48 bushels of grain and 9½ tons of straw : the red hallett yielded 47 bushels and 12½ tons of straw ; and the quantities of straw seem so enormous that it may be as well to mention that they are certified exact by M. Charles Fasquelle, formerly professor of Agriculture in that district. Results scarcely less remarkable have been reported to the Societè Nationale d' Agriculture from the farm of Arcy-en-Brie, not far from Paris. The area under cultivation was 230 acres, and the general average yield was 35 bushels an acre. But while the fifteen acres sowed with golden drop averaged 52 bushels an acre, the daitel and lamed wheats, which are hybrid varieties raised by M. Vilmorin, and the Victoria averaged only about 39 bushels an acre. The smallest average of the nine varieties tried was that of the Noe, which did not exceed 27 bushels per acre. Some 95 acres were sown with mixtures, the yield of which averaged 33 busheles an acre. It is worthy of remark too, that the yield of 35 bushels an acre on this farm was about 11 bushels an acre (representing a money value of nearly 50s.) in excess of the yield in the rest of the Department, and this was obtained without any appreciable addition to the cost of labour, seed, or manure. Very striking, too, are the results arrived at upon the farm of Wardrecques, in the Department of the Pas-de-Calais, particulars of which have been forwarded by the occupiers, Messrs. Dehèrain and Porion, to the Acadèmie des Sciences. They had similar experiments last year, when they succeeded in growing 55 bushels of wheat and 8 tons of straw per acre. This year they grew 61 bushels of wheat and 7 tons of straw, but they add that though, in spite of the unfavourable season, there was an increase in quantity, the weight and quality of the wheat was considerably inferior. Their wheat is all of the square headed variety, and they maintain that their profits, after deducting the heavy cost of labour and manure, vary between £10 and £6 per acre, attributing the favourable result obtained this year to their choice of a variety of wheat which can stand heavy manure without getting laid.

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TOBACCO growing in England as a field crop may now be said to have been proved beyond dispute , and the following interesting report, which has been published on the growth of tobacco on a quarter of acre of land on Lord Walsingham's home farm at Merton, Norfolk, adds further testimony to this fact :—The land upon which the tobacco was grown may be described as fairly good mixed light land, with a sandy subsoil, the agricultural rental value of which may, in ordinary times, be estimated at about 22s. per acre for rent and tithe. The preparation for the tobacco plants was as follows :—The land was twice ploughed, the depth of the first ploughing was 6in. and the second 7in, deep. The land was harrowed after each ploughing, and especially after the second earth, when it was well worked to get a good and fine tilth. It was then ridged up into balks 30 in. apart, and six full-sized cartloads of well-made farmyard manure were put on to the quarter of an acre of land. After the manure was applied the ridges were split down by a double breast plough, which effectually covered the manure. A light wood roll was run over the bridges to level them, and also to pulverise the soil to receive the tobacco plants. On June 16, last, the plants were received from Carter & Co., in good, fresh condition, and were carefully planted the same day. The number of each variety of tobacco plant was as follows :—Big Frederick, 100 ; Virginia, 100 ; Pennsylvania, 1,100 ; Connecticut 400—total, 1,700. For about three weeks after planting, the weather was very dry and cold, and the plants appeared to make no progress, but rather went backward than forward, although the precaution was taken to put sheepfold cloths. supported by hurdles, to protect them from the cold north winds prevailing at that time.

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IT was recommended that a pinch of gypsum should be put on the crown of each plant, and that they should not be watered. It was seen that the plants made no progress ; therefore, against the advice received, they were watered on the first and third days of July, and from that time the leaves freshened and the plants made a rapid and vigorous growth. The land about the plants was carefully hand-hoed three or four times, and between the balks it was deeply cultivated. On Aug 10 the side shoots on the plants were pinched off, and this was done every time they appeared. On the 19th of the same month, or within a few days following this date, the leading shoots of the plants were removed, leaving about nine of the best leaves on each plant. It is desirable that it should be known that it is important that the leading shoots of each plant should be stopped, for while the leaves on a few left unchecked were about 18in. long and 7in. wide, many of the leaves on the plants where the leading shoots

were removed were 36 in. long and 18 in. wid In consequence of the appearance of frost, it was thought advisable to secure the crop, and therefore the plants were out off close to the ground on Sept. 20; but before this was done, the stalks were split open from the top to about 2in, from the bottom. The plants were then carefully placed across sticks, each stick being 4ft. long, and carrying eight plants. The sticks upon which the plants were hung were then carried to the drying houses. In about a week's time from the plants being hung up in the drying houses wood fires were kept burning during the day and part of the night, and the temperature was kept as nearly as possible at 70 degs, for about fourteen days, when it was raised to about 80 degs. When the plants were first placed in the houses they necessarily occupied more space than they did when the leaves withered. The plants were afterwards placed closer together. The fires were kept going until all the sap disappeared from the stems and from the middle rib of the leaves. For the last two days of the fires being used the temperature of the sheds was raised to 90 degs. After this the plants were left hanging, to allow the leaves to relax, so that they could be stripped from the stems, sorted, and tied into bundles, each bundle containing say, eight leaves, which were neatly bound together at the top by a half leaf. After the leaves were bound as described above, the bundles—or hands, as they are called in America—were packed closely together on boards, and covered with sacks and weighted, the temperature of the room being kept sufficiently high to prevent mould.

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BUTTER-making as a science is utterly unknown in this country, but to those who may be engaged in this industry on any considerable scale, the following instructions for butter-making, which are observed at the Ontario Agricultural College Farm Canada, will perhaps commend themselves as worthy of consideration :—

1. Good ventilation for the milk-house, milk-cellar, or dairy. room is most essential, and may be provided for by leading an air-drain under ground for, say, 200 feet. Through it a supply of pure, fresh, cool air may be admitted. The foul or warm air may be allowed to escape through ventilators or windows in or near the ceiling.

Cream should invariably be removed from the milk before the milk is sour.

3. The cream of each churning should be gathered into and kept in one vessel.

4. The whole of the cream should be well stirred every time fresh cream is added.

5. In summer, cream should not be left longer than three days before churning.

6. The best churning temperatures are between 57 and 60 degs. during summer, and between 60 and 64 degs. during the winter.

7. Butter can be more thoroughl washed free from butter milk, while in the granular condition than after it is gathered or pressed into a roll.

8. Only the best pure salt of medium and uniform fineness of grain should be used, and from three quarters to one ounce of salt per pound of butter will be found satisfactory for the summer.

9. The utmost cleanliness in milking, in vessels, in utensils and in all surroundings must be observed to preserve the flavour and body of milk, cream, butter and cheese from contamination.

The same authority uses the following general rules :—

1. Milk from healthy cows only should be used, and not until at least four days after calving.

2. Any harsh treatment that excites the cow lessens the quantity and injures the quality of her yield.

3. Cows should be allowed an abundant supply of wholesome, suitable food, and as much pure water as they will drink.

4. A supply of salt should be placed where the cows could have access to it every day.

5. Cows should not be permitted to drink stagnant, impure water, nor to eat cleanings from horse stables, leeks, turnip tops nor anything that would give the milk an offensive taint.

6. All milk vessels should be thoroughly cleansed, first being well washed, then scalded with boiling water, and afterwards sufficiently aired to keep them perfectly sweet.

7. Cows should be milked with dry hands and only after the udders have been washed or well brushed.

8. Milking should be done and milk should be kept only where the surrounding air is pure and free from all objectionable and tainting odours. Milking in a foul smelling stable or yard imparts to milk an injurious taint. Sour whey should never be fed, nor should hogs be kept in a milking yard, or near a milk stand.

Tin pails only should be used.

10. All milk should be properly strained immediately after milking, and for that purpose a detached strainer is preferable to a strainer pail.

WE have before us some correspondence regarding two agricultural exhibitions to be held some time this month in the Madras Presidency, one at Erode and the other at Gooty. It appears to be somewhat strange that these functions should be decided upon in so hurried a manner as in the cases under notice. By thus hurrying matters through it is not always possible to obtain satisfactory results; for it leaves little time to intending exhibitors to make the necessary preparations, and the object aimed at, viz. the getting together of the best material, is necessarily frustrated to a certain extent. The acting Director of Agriculture, in submitting his proposals, mentions that no exhibition was held during the last two years, mainly because of adverse seasons. Now it appears to us that exhibitions should not be dependent upon seasons. They are not regulated upon these contingencies, in the United Kingdom or in America, and we fail to see adequate reasons for doing so in this country. But even supposing the season is to be taken into consideration, sufficent time ought to be allowed. In this instance the Director submitted his proposals on the 6th December 1886, which did not receive the sanction of the Madras Government until the 25th of that month. Then again he asked that orders might be issued for striking off 5,000 copies of the prize list and regulations, and for their being translated into Tamil and Telegu, 5,000 copies of each being furnished to him. Now before this could be done, and the translations distribtued among the cultivators and breeders of stock, we do not suppose there would be much time left for preparations. Upon these grounds we cannot but view this hurried procedure with dissatisfaction. We therefore hope that on a future occasion better arrangements will be made.

Turning to the exhibitions themselves, we note that a sum of Rs, 16,000 has been allotted for the purpose, of which it is proposed to spend Rs. 5,060 in prizes at each of the shows, the remainder being reserved for expenses in connection therewith. The provision of money for the latter purpose seems rather excessive, especially as it is stated in the regulations that "exhibitors will have to pay every expense of transit, delivery, fixing and removing their exhibits, and they must either personally or by their agents superintend the reception and removal of their exhibits, in default whereof the committee reserves to itself the right of doing whatever may be considered necessary at the expense of the exhibitor." Prizes for horses have been omitted by the Director, "because animals of this size are not bred in the agricultural district of the presidency;" ponies and galloways are provided for, however, as "Government attach great importance to the improvement of the breed of country ponies." For this latter reason prizes have also been provided for dairy stock. The money has been apportioned as follows :—

	Rs.
Live stock	1,815
Vegetable products	1,498
Animal products	221
Manufactures	830
Implements and machines	704

There are twelve prizes for ponies, galloways, asses, and mules, ranging from Rs. 10 to Rs. 50, and aggregating Rs. 330; 24 prizes for draught cattle, including bulls, cows, and calves ranging from Rs. 10 to Rs. 60 and aggregating Rs. 700;

20 prizes for dairy cattle, from Rs. 10 to 30, aggregating Rs. 470; 10 prizes for buffaloes from Rs, 10 to 20, aggregating Rs.155; 12 prizes for sheep and goats of wool-producing breeds, and Rs. 12 for mutton-producing breeds, from Rs 3 to 10, agregating Rs. 160; 45 prizes for cereals, the highest being Rs. 10, and the lowest Rs. 2, aggregating Rs. 174; 27 for pulses in the same ratio, aggregating Rs. 102; and 36 for oil seeds, for which the highest prize offered is Rs. 7, and the lowest Rs. 2, the total amount being Rs. 143. In the class for fibres competition is restricted to cotton, roselle (*Hibiscus sabdariffa*) and *sunn* (hemp). Prizes from Rs. 5 to 20 are to be given, aggregating Rs. 155. It is a pity no other fibres are allowed to compete. Then there are 18 prizes for sugars and sugar-cane, 9 for dyes, 6 for tobacco, 9 for tea, coffee and cinchona bark, 24 for condiments and spices, and 11 for farinaceous foods, such as sago, arrowroot, &c.; the prizes range between Rs 2 and 15, the highest, Rs. 25, being offered for chayroot, a dye plant. In the class for fodders, 39 prizes are offered, valued at from Rs. 2 to Rs. 5, while for vegetables and fruits there are 14, from Rs. 3 to 5. Respectable prizes, (Rs. 25 and 20) four in number, are offered for timbers suitable for agricultural implements and cabinet making, while for minor forest produce, such as gums, resins, bees-wax, honey, &c. Rs.150, divided into 14 prizes, ranging from Rs. 3 to 20. Dairy produce and utensils have 12 prizes from Rs. 2 to 5 each; silk wool and leather 13 prizes; the highest Rs. 25 being offered for the best collection of tanned skins. A sum of Rs. 830 divided into 105 prizes, has been set apart for Indian manufactures, the highest amount, Rs. 30, being offered for woollen carpets and carving in wood and stone. In the class for implements and machines the total amount, Rs. 704, has been divided into 51 prizes, the largest sum Rs. 40 being offered for a machine for husking paddy, and a sugar mill. The highest prize for ploughs being Rs. 20.

Turning now to the comments of the Board of Revenue on the above list of prizes, we note with satisfaction that our views have been forestalled, as it were, on this subject, and we cannot therefore do better than reproduce them *in extenso* :—

"Considering the lateness of the date, the Board accept the prize list as it stands rather than delay its issue by a discussion which might so postpone its publication as to go far to neutralize the advantage of holding an exhibition at all. But at better leisure it seems desirable to consider in connection with future shows whether it would not be well to omit tea, coffee and cinchona bark which are large industries not likely to be influenced by such small prizes as those offered and which cannot be properly judged except by specialists and analisation. The handsome gold medal and prizes given for tea by the Agri-Horticultural Society of Madras are not awarded without the exhibits being submitted to experts in Calcutta, for which purposes these exhibits have to be sent in earlier than the others. The honorific value of a medal is worse than neutralised if the judge be not a thoroughly competent specialist. Whether any practical good is calculated to arise out of a number of small prizes for different grains, and whether it might not be better to concentrate the same prize power on more substantial encouragement to draught cattle is also a matter worthy of further consideration.

In connection with the cattle prizes, the Board submit that excellence in draught cattle is in this country the very backbone of agriculture. It lies at the root of the improved plough question, and is essential to cart carriage of farm products. It is not to be forgotten also what an important part good draught cattle play at times in supplying the means of carriage for troops and in the commissariat generally. From these points of view it would seem that a hardy breed of draught cattle is of more importance to the State generally than milch kine: and it should not be lost sight of that while the cows of draught cattle will equally supply milk, small milch kine like the Aden breed can never be producers of oxen fit for draught. If really handsome prizes serve to bring to distant localities bulls of the best draught breeds, it may be expected that not a few will find purchasers at these shows, and thus these exhibitions will, wherever they are held, tend to improve the local breeds in the direction of excellence in draught, and will do more perhaps than even the Government farm instituted for the purpose. They will naturally grow into cattle fairs as well as exhibitions, fairs at which there will be the best opportunity of procuring improved stock and the best sale for them. But to induce breeders to face the risk and expense of bringing good bulls any distance, the prizes must be much more valuable than those now proposed. From the agricultural point of view therefore that in this country excellence in tillage is necessarily dependent on excellence in draught power, it might be considered whether in future years savings in other directions might not advantageously be utilized in swelling the prizes for draught cattle."

We referred last week incidentally to the inutility of giving a number of small prizes instead of a few large ones; and we are glad to find the Board of Revenue hold the same views. We hope that next year, if other agricultural exhibitions are held, this point will be well considered before the prize list is drawn up.

HYBRID POTATOES.

It is curious to note the present agitation concerning our national tuber, the potato. National it has come to be regarded for more than one reason, into particulars of which it is not necessary that we should enter here. It may now be called a sort of 'potato revival' for even the London *Times* opened its columns to a discussion of the subject, and the following appeared in an issue of November last :—

It is known that the species of potatoes, *Solanum tuberosum*, from which all the varieties in cultivation sprung, is a native of the higher Andes mountains, where rain is almost unknown, and the varieties we possess may therefore be liable to degeneration in stamina in our moist climate. But there exist other varieties of potato which had never been cultivated before recent experiments were made. One of them is the *Solanum maglia*, discovered by Darwin in the Chonos Archipelago, 44 deg. to 46 deg. south latitude; and this plant is remarkable as choosing for its habitat lowlying marshy places near the coast Could the *Solanum maglia* be made the parent of a sort of potato which would not be averse to humidity, and would not become affected by the *peronospora fetans* or potato disease? At the instigation of Earl Cathcart, who procured from Mr. Baker of Kew tubers believed to be of the new variety, Mr. Arthur W. Sutton of Reading, commenced in 1884 the important and hopeful experiments which have now reached a mature stage. The so-called *Solanum maglia* bore abundant flowers, but had never been know to yield a seed-berry. The red-skinned tubers were started in pots, and care was taken to fertilize the flowers with pollen from some of the best so-called disease-resisting potatoes at present in cultivation. Three fully developed berries, well filled with seed, were obtained, and these were sown to produce seedlings in 1885, The effect of cultivation upon the *Solanum maglia* was, that while the tubers received from Lord Cathcart were about the size of a pigeon's egg, the produce of the first year's growth consisted of tubers quite as large as an ordinary potato, with as many as eight up to twelve tubers to a root. Cooked they proved of fair quality for the table. There now remains to follow the fortunes of the seedlings to the present time.

A number of scientific gentlemen, including Dr. Hogg, Dr, Masters, Mr. Shirley Hibberd, and other authorities in potato history, visited Messrs. Sutton and Sons' trial grounds at Reading to notice the experiments, which have been very successful and satisfactory. It is agreed that the parent in the cross was not, after all, a true specimen of *Solanum maglia* but was a specimen of a wild form of *Solanum tuberosum* of a distinctly different geographical origin from the variety which furnished the varieties commonly cultivated, and this wild form has been preserved for many years at Kew gardens in a bed side by side with the plants of *Solanum maglia*. Twenty-three plants were obtained from the seed grains in 1885, and the tubers have again in the present year vastly increased in weight, up to 122lbs. from 13½oz. The cross is between the wild *Solanum tuberosum* and the variety known as Sutton's Reading Russet. In point of quality and shapely form, they leave nothing to be desired, and reached a high standard of merit. Several other crosses have been obtained in this first attempt to introduce new blood into the potato, successful hybrids being bred from the wild species crossed with Walker's Regent, Paterson's Victoria, and other popular varieties.

Mr. A. H. Blechynden, formerly Secretary of the Agri-Horticultural Society of India, had his attention attracted

by the above notice, and put himself in communication with Mr. Sutton on the subject, and has now written the following letter to the society here, forwarding Mr. Sutton's reply and the notice from the *Times* :—

The subject of potato hybridisation has been recently engaging the attention of horticulturists in this country as a reference to the accompanying printed papers will shew. Under the impression that it may be considered desirable to make an experiment in the economic portion of the society's garden, I have been in communication with Mr. Arthur Sutton, of Sutton and Sons of Reading, and the authorities at Kew. I now enclose a letter from Mr. Sutton on the subject, and forward a few tubers of *So'anum maglia* just received from Kew. It is probable as *S. maglia* prefers low-lying mars hy places, that a cross between it and *S. tuberosum* (should you succeed in effecting it) could be successfully introduced in similar localities in India, where the ordinary potato cannot be advantageously cultivated. Under any circumstances it is worth a trial. Should it be deemed desirable I will accept Mr. Sutton's kind offer of a supply of the wild form of *S. tuberosum*."

The following is the letter of Mr. Sutton refered to :—

In reply to your letter of the 22nd instant, I regret that our stock of the true *Solanum maglia* is exceedingly limited, although we have a very large quantity of a wild form of *S. tuberosum* which has been cultivated for some 30 years past in the Royal Gardens at Kew. I shall be very glad indeed to ask your acceptance of some of the latter, and if you would also like some of the *S maglia*, I am sure Mr. Baker, the Curator of the Royal Herbarium at Kew, would be most happy to supply you. As you may have gathered from some of the reports appearing in the press, it is now ascertained that the turbers we have been experimenting on under the name of *S. maglia* were really the wild form of *S. tuberosum* above referred to, which had been sent to Lord Cathcart by mistake.

The foregoing correspondence has been published by the society in their monthly proceedings for January 1887, wherein it is stated that the tubers of *Solanum maglia* have been duly received ; but as this is an unsuitable time for planting them in Bengal, the society propose to send them to Darjeeling to be grown, and the increased stock can be planted here in October or November next. We shall therefore await the result of this experiment with interest.

NOTES ON THE BEHEEA SUGAR-CANE MILL.

[BY BURROWS, THOMSON, AND MYLNE]

(Continued from last week)

" THE total produce would be increased by the value of nearly a crore and a quarter of rupees."

The Report of the same department for year ending March 1881, says :—

' The duty of this department is clearly that of a pioneer thoroughly acquainted with the wants of the Indian cultivator, it must, by experiments, ascertain what implements used in the more scietific methods of the agriculture of the West, it can adapt to his ideas and his purse. When experiment has done its work, further action should be left to private enterprise, and what this can achieve is shown by the success of the Beheea Sugar Mill, now sold by thousands in the sugar-producing districts. This department has taken every opportunity of encouraging the use of this excellent machine, but the patentees, by establishing agencies in the districts where the demand is likely to be greatest and where the purchaser can have a broken mill repaired or exchanged, have in a short space of time popularised their invention to an extent that we can only hope the improved plough, winnower, and pump will gradually reach "

Colonel C B. Lucie Smith, Commissioner of Chuttisgurh division, Central Provinces, in his Report, October 1881, says :—

" The sugar-cane mill commonly used in this district as perhaps also in the rest of Chuttisgurh, is a rough machine made entirely of wood, and having three rollers so as to allow of two sets of sugar-canes being squeezed at once. Each set consists of two or three canes, according to the length of the rollers ; and the machine requires one pair of buffaloes to work it, the local bullocks being wanting in power. Three sugar-cane mills were obtained from Messrs. Thomson and Mylne of Beheea at the beginning of the last cold weather, and they were lent to *malgoozars* in different parts of the district, in order that their superiority might be tested and their advantages become generally known. The Beheea Mill has only two rollers, but they are solid iron and of uniform length. Three sugar-canes can be put in at a time, and one buffalo or even bullock is sufficient to work it, In the local mill a cane has to be passed twice between the rollers to extract all the juice, whereas the Beheea Mill presses out the whole of the juice at once, The following is the result of an experiment made at Ratanpore The local mill had a pair of buffaloes and three men. The Beheea Mill one bullock and two men :—

		Weight of cane put in.	Quantity of juice expressed.
Local	... ...	20 seers.	13 seers twice expressed,
Beheea	... ...	20 ,,	14½ ,, ,,

Thus with one man and one animal less, the Beheea Mill extracted one-and a half seers more of juice from the same quantity of cane in 30 minutes. Its superiority over the local mill has been appreciated and acknowledged by all the agriculturists who have seen it at work.

R. Logan, Esq., C. S , Commissioner of Nursingpore, Central Provinces, writes 19th March 1881 :—" Two mills were purchased. They were both exhibited at Birman and attracted some attention, but practical demonstration of the working of the mills was needed to convince the people of their value. Both mills were set up after the close of the fair at the village of Sehora, in the Gadarwara tahsil. The mills acted most successfully. Both mills have been bespoken by *malguzars* for next season, and will be sold at their full price, and I have had several applications for more mills which will be complied with at the proper season. As regards the working and outturn of these mills no doubt whatever can be entertained. The quantity of juice expressed, is said by the *malguzars*, to be about 25 per cent greater than is obtained from the ordinary stone or wooden mill. It is exceedingly clean and pure, and the *goor* manufactured is of an exceptionally fine description, selling at from three to four seers per rupee, when ordinary *goor* sells for from five to six. I was able to show you at Kareli a quantity of cane juice and *goor* produced by this mill which, perhaps, you remember. The goor was the finest I have ever seen."

G. J. Nicholls, Esq., Deputy Commissioner, Nursingpore, writes 8th January 1883 .—

" It gives me great pleasure to inform you, that your sugarcane mill, I may say, surprised my *malguzars* and cultivators when its work and outturn were shown to them at the Nerbudda Valley Agricultural Show. The *goor* produced was of a quality far superior to anything before produced in their district. I am glad to take the mill recently sent here, and would beg of you to send me two more mills of the same improved pattern with the least possible delay "

N. H. Patuck, Esq., Superintendent, Holkar State Farm, Indore, writes (to the *Bombay Times*) June 17th 1882 :—

'Last cane crushing season I bought one of the Beheea Cane Mills from Messrs. Thomson and Mylne, Beheea. After crushing the sugar cane grown on the State farm, the mill was let out to cultivators who willingly hired it for crushing their cane. It was found by them much superior to the native implement (the *kolhu*) and consequently there was such a great demand for it as to enable me to recover nearly a third of its cost, notwithstanding it reached the farm very late in the season. It is very simple in construction, and can be readily adjusted for all sizes of sugar-cane, and even for the newly introduced sorghum saccharatum, which is difficult to crush in the *kolhu*. It crushes the cane very efficiently, so much so, that even the colouring matter of the rind and other extractives are also pressed out.

In the following table I give the comparative cost, efficiency, working expenses, &c., of the Beheea Mill and *kolhu* :—

	THE " KOLHU."	BEHEEA CANE MILL.
Cost price ...	Rs. 70 ...	Rs, 100.
Yearly repair ...	,, 7 or more* ...	Almost none.
Working cost for 24 hours	,, 5 3 9 ...	Rs. 1-14.
Work done in 24 hours.	† 320lbs. of juice adulterated with a large quantity of water... ...	480 lbs. of pure juice.
Danger to life or limb,	Much when the beams break ...	None.
15 thin white sugar-canes gave ...	9lbs. juice ...	13 lbs. juice.
17lbs. black sugar-cane gave	9½lbs. juice ...	12½ lbs. juice.
22lbs. Chinese sugar-cane gave ...	Impossible to crush efficiently ...	12 lbs juice.

Angus Campbell, Esq., C. E , (Superintendent, Government Foundry, Roorkee) writes :—" I consider as a Mechanical Engineer that the mill answers every purpose for which it was designed and that as as a domestic sugar-cane, mill adapted to the system on which sugar-cane is grown in India, nothing could be better. Those mills are rapidly superseding the *kolhu*, and they have solved the difficulty there was in extending the cultivation of sugar-cane along the line watered by the North West Provinces canals."

Bradford Leslie, Esq., C. E , Chief Agent, E. I. Railway, says :—" The object aimed at by Messrs. Thomson and Mylne in their original specification was the provision of a portable domestic sugar-cane crushing machine suited to the wants of the cultivators of India, and it is obvious that to meet the wants of such cultivators, it was indispensable that any machine to be used by them should not be costly; that the mechanism should be

" * The three wooden beams cost Rs, 21 and last only three years, but are liable to break even in the first year

" † Water is indispensable in the *kolhu* for softening the cane, 80 lbs. of pure juice from the mill gave 20 lbs of *goor*, whilst the same quantity of juice (adulterated with water from the *kolhu*) gave only 12 lbs. *goor*,

" The Beheea Mill is a portable machine, and can be easily removed from one place to another by five persons, It can be fixed in the very field the canes of which are to be crushed, and thus the cost of taking the canes to the machine is saved,"

simple and not easily deranged, and easily repaired and cleaned; and also that the machine should be portable and easily worked. It would be in my opinion, difficult to conceive anything more perfectly adapted to the attainment and fulfilment of the above objects than the machines so examined by me. The simple arrangement and construction of the frame, so as to allow of the machine being fixed in a rigid position for work by planting the four splayed timber legs a few inches in the ground could not be improved upon, and a specially good and novel point in the design of the frame of the machine in question, is the ease with which the upper beam of the machine can be removed and replaced when necessary to get at the rollers to clean them or for any other purpose Minor points of detail in the machine which struck me in the course of my examination are the countersinking of the undersurface of the rollers to prevent the juice flowing down the axles, and the formation of the juice tray of metal with raised edges round the holes through which the axles pass, to prevent the juice escaping through the holes also the inclination of the juice tray so as to bring the discharge on the same side as that on which the cane is fed and such points respectively are in my judgment and belief novel as applied to such a machine and necessary to its completeness the arrangement, also for adjusting the position of the secondary roller by means of set screws pressing on the brass bearings is an ingenious simple and efficacious adaptation for the purpose. The points of difference between Messrs. Thomson and Mylne's machine and *mahagundi* are marked and distinct. The former is in my judgment and belief, a novel and ingenious combination of details into a machine the essential feature of which is that it is portable as a machine, and capable of doing an amount of work in a maner impossible of attainment with the *mahagundi* The latter from its great size, which is necessary and unavoidable owing to the material used to construct the rollers and axles or journals is a fixture and can be available only for crops within a convenient range from its location ; while Messrs. Thomson and Mylne can be taken to any distance and set to work in few minutes. Furthermore the great size and cumbrous character of the rollers and axles of the *mahagundi* causes the greater portion of the power applied to be absorbed by the friction of the working parts, leaving only a small balance available for the crushing of the cane, and causing necessarily a great amount of wear. Messrs. Thomson and Mylne's machine on the other hand is so constructed, that the friction and wear and tear are reduced to a minimum with the result of an economy in working power wholly unattainable in such an appratus as the *mahagundi*. Another point of marked difference is that timber being the material used in the construction of the rollers of the *mahagundi*. It is impossible that it ever could be an efficient machine, timber being a porous material of a cellular structure, must absorb a certain part of the juice and cannot be kept clean, and the result must be that the juice while being expressed is brought into contact with the fermented matter in the pores of the wood. Another point of difference is that Messrs. Thomson and Mylne's mill is so arranged as to deliver the juce expressed from the cane a height of about two feet from the ground, whence it falls into a vessel placed to receive it and this vessel can be easily removed and cleansed; on the other hand the juice expressed by the *mahagundi* being delivered very close to the level of the ground into which the sill supporting the lower rollers is sunk, such juice must necessarily be recived into a vessel sunk in the ground and this vessel cannot be removed without considerable trouble and interference with the working of the apparatus. I consider that Messrs Thomson and Mylne's machine thoroughly answers the purpose for which it was designed, and is a novel combination of parts into a well conceived practically constructed machine eminently suited, from its simplicity, cheapness portability, and perfect working, to meet the wants of the Indian cultivators. From the examination before mentioned, I am able to say that, in my opinion as an engineer, the saving of power in the machine constructed according to Messrs. Thomson and Mylne's specification, by the reduction of friction, must be at least four or five hundred per cent as compared with the *mahagundi*, while the quality and quantity of the outturn of the former machine, as compared with the *mahagundi*, must be proportionately improved."

C. H. Denman, Esq , C.E , Engineer-in-Chief, East Indian Railway says :—"The difference between Messrs. Thomson and Mylne's machine and the *mahagundi* is vast; the latter, if made with the object of obtaining the greatest amount of friction with least amount of work and greatest amount of labour, undoubtedly attains that object, while the former in addition to reducing the friction to a minimum, and thus minimising the labour required to work it, is capable of performing a very much greater amount of work, and in a better way than the *mahagundi* can."

W. G. Olpherts, Esq, C.E , says :—"I have been for some years past acquainted with the machine for expressing juice from sugarcane called the Beheea Mill. Having been struck with its remarkable simplicity and suitability for the purpose for which it was designed, I purchased two such mills, and introduced them to the cultivators of certain villages in the Jubbulpore district. What was required for India at the time Messrs Thomson and Mylne invented the Beheea Mill, and so solved the problem, was a machine comprising the advantages and effectiveness of Western ideas to complete in simplicity and portability and at a moderate price with the native wooden mills, and this requirement has been, in my opinion, most completely fulfilled by Messrs. Thomson and Mylne's invention. It is a well known fact to every one possessing experience of the natives of India, especially of the class to which the cultivators who require to use machines for expressing the juice from sugar-cane belong, that there is nothing more difficult than to induce them to give up any old and tried methods for attaining any particular object, and to adopt Western appliances and inventions in lieu thereof, and in my opinion, the successful results of any such attempt as I know Messrs. Thomson and Myine's has been in the case of the Beheea Mill, is as meritorious and as well deserving of an exclusive privilege as the most elaborate invention would be entitled to in England."

Mr. Wm. Renwick, Mechanical Engineer, who has put within reach of the cultivators of the districts of Eastern Bengal, upwards of 4,000 of these mills, which he lets out on hire for the season, says :—"I have been acquainted with Messrs Thomson and Mylne's sugar-cane mill, since the cane season of 1874 75, and since 1879 have been engaged in the business of making, selling, and letting on hire sugar-cane crushing mills, made after the pattern of Thomson and Mylne's Beheea Mill, to the ryots of Furreedpore, Rajshaye, Nuddea, Bogra, and Dinajpore and am therefore throughly well acquainted with their construction and mode of working. I have also observed the construction and working of the native mills used in the districts abovementioned, *viz.* :—(1)—The horizontal wooden-rollers mill, which consists of two roughly constructed wooden-rollers placed one above the other, worked by men using both hands and feet. In these mills the cane has to be passed through six or seven times, before it is fully pressed out to the satisfaction of the cultivator. (2)—The pestle and mortar arrangement. called in various districts *kolhu ghanigach*, *roopgach*, &c., which consists of a heavy block of wood hollowed out, somewhat in the form of a mortar, into which are thrown short pieces or thin slices of cane, and in which a long heavy lever is made to revolve, and by so doing expresses the juice, an attendant being busily occupied in keeping the cuttings under the revolving lever. When the juice no longer flows freely, the attendant clears out the refuse from the mortar, and puts in fresh cuttings to be similarly operated on. (3)—The vertical Wooden roll Mill called the *cherki* or *mahagundi*. This mill has two rollers, very large and cumbrous, set in a heavy wooden frame fixed in the ground, the lower side of the frame being level with, and buried in the ground; one of the rollers is made to revolve by means of a lever, and this by means of a gear of three spiral teeth carved in each roller, and interlocking, causes the other to revolve also. Thomson and Mylne's mill is far superior to the *cherki* mill in the following particulars, amongst others :—(*a*)—While the journals of the Beheea Mill are of wrought iron supported in bearings of brass or other alloy found most suitable to destroy friction, the journals of the *cherki* are of wood supported in wooden blocks, thus forming a combination of materials most likely to create friction. Being of wood, these journals are, and required to be, about three-and-a-half times the thickness of the wrought iron journals of the improved mill. The frictional resistance, already very heavy in the *cherki* on account of the unfavourable materials of which it is made, impedes the working of the mill in one revolution over a distance, three-and-a-half times greater, with a leverage three-and-a-half times greater than in the Beheea Mill. (*b*)—The spiral teeth of the wooden rollers create enormous friction, and cannot be worked without causing an intolerable noise. (*c*)—The *cherki* is not portable, and is inferior to the *kolhu* (pestle and mortar arrangement) as a cane-crusher. (*d*)—The Beheea Mill does at least three times the amount of work, which one of those wooden vertical roller mills is able to do. (*e*)—In the latter, the cane must be passed through the rollers five or six times before the juice, which can be expressed is got out, and as the rollers cannot be kept close together, the partially crushed canes have to be twisted into a sort of rope to give the rollers sufficient substance to squeeze, while in the Beheea Mill the canes are simply presented singly, whole as they are cut from the field, being gripped and pressed between the rollers, which are easily kept so true and so close together, that nothing which is not capable of being gripped and drawn through can pass their line of contact. The Beheea Mills are rapidly superseding the old native mills of every kind. The portability of Thomson and Mylne's mechine is a most essential feature in it, as it enables many individuals to join in the purchase of one machine, which can be carried from field to field, however distant they may be apart ; and before the introduction of it, no machine had ever been introduced for expressing the juice from sugar cane capable of meeting the wants of the ryots of India."

J. Cruddas, Esq., Mechanical Engineer, of the firm of Richardson and Cruddas, Engineers and Iron Founders, Bombay, writes :—"I consider Thomson and Mylne's mill in all respects the most complete and simple as a domestic sugar-cane mill. I examined it in every detail some time ago, with the object of introducing an iron frame to replace the wooden one, but keeping in view the great essentials for such a mill, of simplicity, facility for simple repairs and cheapness, I found that I could not improve on the mill in the least degree."

Analysis by J. Lakor Macmillan, Esq , F. C. S., of *goor* (unrefined concrete sugar) from sugar-cane juice, expressed at same times and places and from same cane, by native mills and Beheea Mills.—

	Native Mill, *Cherki*.	Beheea Mill.	Native Mill *Roopganch*, or *Kolhu*.	Beheea Mill.
Crystallizable sugar ...	66 7	78 38	71 6	81 38
Uncrystallizable sugar ...	16 3	6 42	12 4	6 22
Water	6·2	4 10	11·—	7 5
Ash	2·—	1 40	2·4	1 6
Soluble organic matter ...	7 07	9 62	3·6	3·30
Insoluble ,, ,, ...	—·83	—·08	...	...
	100 —	100·—	100 —	100·—
Net sugar by Co. : 3—1 ...	44.4	67 76	51 0	70 36

Analysis by David Waldie, Esq., M.D., F.C.S., Analytical Chemist, Calcutta—

	Native Mill, *Mahagundi.*	Babeca Mill.
Cane sugar or sucrose	59 53	69 97
Grape sugar or glucose	17·98	13 30
Other organic matter	5 41	2 37
Water expelled by heat of water-bath	15 30	13 40
Mineral ash	1 78	—·96
	100·—	100·—

(*To be continued.*)

Miscellaneous Items.

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 1st February was 147,039,919lbs., as against 146,314,463lbs. in the corresponding period of last season. The exports to the United States and Canada during the same period were 87,401,596lbs, as against 76,606,582lbs.

THE Singareni coal fields in the Nizam's territory, extend over an area of about 19 square miles. The coal is chiefly found, however, within some eight square miles. Four seams have been proved by boring, the thicknesses at one place reaching to 34 feet, although the other borings reveal on'y 6, 3, and 3 feet respectively. The coal is said to be equal to good English, and burns with very little wastage. It is expected that the railway will be laid down to the mines in about three months' time.

AN industrious observer has been to the trouble of noting for himself the productiveness of the commonest weeds. He says that upon one plant of Shepherds Purse he has found 3,100 pods, containing an average of 25 seeds each—ascertained by taking 20 pods from the plant at random, and counting the seeds in each—making 77,500 the total number of seeds produced. Another plant bore 2,500 pods or 62,500 seeds, the average number of seeds per pod being the same in both plants. A large common plaintain bore 33 spikes, each having from 139 to 448 fruits, each containing from two to six seeds. The average number of seeds per fruit was 4·5, and the average number of fruits per spike 293·4, the total number of seeds per plant being 43,509 ! This reckoning gives one an idea of the wonderful fecundity of weeds, and from it we can more fully comprehend the significance of the adage, " One year's seeding makes seven year's weeding."

WASHING butter in the granular state, says our Chicago exchange, to free it from buttermilk and save the injury to the grain by working has been a theme much dwelt upon by dairy writers. But now comes the *American Dairyman* who says. " Washing granular butter washes out the flavor. There is no mistake about it, and the problem every dairy man and maid has to solve is how little to wash, how little to work, how little to salt to get the best results in the matter of flavor, grain keeping qualities, etc. Salt brings out and develops the flavor; working removes the excess of moisture, brine or whatever it is; water removes the buttermilk and with it some flavor which we would gladly retain " He suggests that the centrifugal pump provide some arrangement by which the buttermilk or brine can be separated from the butter, saving both the washing and the working. That is the way it always goes, nothing remains permanently fixed. We no more than get comfortably settled down in some particular method or idea than some fellow comes along with something which upsets us and makes it necessary to reconstruct all our plans and ideas.

A NORTHERN Australian papers says :—Mr. Holtze who has returned from a trip to the Adelaide river has kindly showed us a specimen of the Liberian coffee plant taken from the block of land experimented on by Fisher and Lyons. To us it appeared a perfectly healthy plant, entirely free from any traces of the ravages of insects and Mr. Holtze describes it as a fair average specimen of some 10,000 plants growing on the plantation. He had taken from the plant no less than 320 berries, and as it is only about three years since the plantation was started, and during the major portion of that time it had been utterly uncared for, the bush gives an excellent idea of what might be done by careful cultivation The whole of the plants are said to be in a fine healthy condition, with an average height of three feet, and many are already bearing luxuriantly It is the intention of Mr. Holtze to send the plant to Adelaide as a practical proof of what the territory can do in the way of growing coffee, and if such a result can be furnished by a plantation that is allowed to run wild, we think it is only a fair assumption that the industry would well repay a little care and attention.

INSURANCE against hail is the latest suggestion for adoption in this country, as the following letter, received by the Agri-Horticultural Society of India from Mr. J. A. Westwood Oliver, Fellow of the Royal Meteorological Society of England will show :—" I have been in correspondence with Mr. H. F. Blandford, of the Meteorological office of India, in regard to the occurrence of hailstorms in your country, and the amount of damage inflicted by them, and he has suggested, that on the latter point, I might do well to apply to you for information. There seems to be no question that hailstorms are very destructive to the crops, particularly opium and tea, in some districts, and I am interesting myself in the subject with a view to considering the feasibility of affording the protection of *insurance*, As you are no doubt aware, insurance against damage by hail is largely practised in England, and still more extensively in France and Germany, and it has always appeared to me that there are many other quarters of the globe, where the business could be established with benefit to all concerned, perhaps India amongst the number. If you can supply me with any information bearing on this subject, or put me in the way of getting it, you will confer a favour. I am informed that there is a desire to have the protection of insurance, especially on the part of tea growers, but, of course, it is impossible to take steps in the matter until the probable extent of the business has been guaged in some degree, as well as a rough average of the frequency and severity of the storms established," We fear it will be a long time before this idea is grasped by the untutored ryot.

WE in this country have no idea of the enormous trade carried on in America alone in cheese. Thus we gather from the usual report on the American cheese trade of the past year issued by the Utica (New York) Board of Trade, that trade was much more satisfactory in 1886 than in 1885, while there is a good out-look for the coming spring. At the Utica market the number of boxes of cheese sold was the largest on record in the history of the market 325,962 boxes, equal to 19,557,720 lbs., having been disposed of at an average of nine cents. (4½d.) per lb. As compared with previous years, the trade was as under.—

Year.		Number of Boxes.	Value.	Price per lb.
1884	...	315 641	£399 707	5¼d.
1885	...	320,796	306,232	4d.
1886	...	325 962	354,777	4½d.

At the other great cheese market, at Little Falls, the quantity sold was not so large as two years ago, a total of 12,548,100 lbs being disposed of at an average of 4½d per lb., prices ranging from 6¼d, to 3d, per lb. Here the details of the sales as compared with previous years are as under :—

Years.		Number of Boxes.	Value.	Price per lb.
1884	...	226,196	£281,478	5 1-5d.
1885	..	208,067	199,120	3 2-3d.
1886	...	209,135	227,873	4½d.

So far as future prospects are concerned, the report states that, 'judging from what is known of stocks of cheese in existence at central points and from the fact that factories were never more closely sold up on the 1st December than they were this year, the prospect for both dealers and purchasers is favourable for the winter and spring. With nothing more than the ordinary trade from now till the 1st of May, the cheese on hand ought to be thoroughly sold out, and the new season ought to open with bare shelves and with a population ravenous for the spring make of cheese.' If this is the case in America, the situation ought to react on the English market, and cause a rise in the values of English cheese of all descriptions.

Selections.

A MARKET FOR CEYLON TEA.

RUSSIA being, next to Britain, the largest consumer of tea of any nation in the world, our readers will peruse with interest the graphic letter in which Mr. Elphinstone records his experiences in the modern and ancient capitals of the white Czars vast dominions. What he says about his suffering from intense cold will cause our readers to appreciate the desire of the Muscovites to

"—are before they die
The groves and temples of the south."

The cemeteries and mosques of Constantinople being, however, substituted in Tennyson's lines. The instinct which drives the northern hordes southwards is next to irrepressible, and we suspect that do what England, Europe and the world may, the banner of Holy Russia, will yet float over the mosque of Sophia in its new character of a Cathedral of the Greek Orthodox Church." The Russians may then like the Turks take to coffee, but meantime we have to regard them as incessantly engaged in brewing tea in their samovars to keep out the bitter cold which Mr. Elphinstone though a Scotchman found too much for him. But the tea the inhabitants of St Petersburg drink is of a peculiarly delicate quality and has artificially imparted to it a special flavour. Then there is a "ring," such as we had to do battle with in Melbourne, and such as exists also in the United States, who are determined if possible to keep out a new thing calculated to interfere with their vested interest. But the crusade against monopoly commenced by an energetic Ceylon planter will be carried off by others, and long before the Russians are sitting in "the Sublime Porte," they will be delighting in the consumption of large quantities of Ceylon tea, unadulterated and of unsophisticated flavour. The battle against vested interests, custom, habit and taste, may be severe and long protracted, but Ceylon tea which has conquered the markets of Britain, will yet triumph in Russia and in the United States. Mr. Elphinstone tells us in a private letter that he will send out to Mr. Rutherford the samples of tea he brought from Russia, and he promises to let us have the opinions of London brokers on those samples. We cannot doubt that the movement thus initiated by our good friend "Logie" will be followed by up by the Planters' Association of Ceylon and by individual planters. If so much tea is drunk in Russia, burdened as the article is with a duty equal to 1*s.* 6*d.* per lb., we may look forward to an enormous increase when a less onerous tariff is adopted by the Russian Government Not much in this direction, at an early date, however, is to be hoped for from a Government which discredits its own depreciated paper money by refusing to accept its promissory notes and insisting on gold and silver payments. Still reform *must* come even in Russia. Even as matters stand, her tea market is worthy the careful attention of our planters and merchants.—*The Tropical Agriculturist.*

TO THE EDITOR.

London, 18th November, 1886

DEAR SIR,—I have for long believed that one of the best markets for our Ceylon tea could be found in Russia and I accordingly made up my mind to visit St. Petersburg and ascertain for myself what chance there would be for the sale of Ceylon tea, either by wholesale or retail agency. Through the kindness of a friend of mine, one of the largest merchants and shipowners in the Leith and St. Petersburg trade, I was enabled to do my journey at a nominal cost and I am satisfied that my fortnight in Russia gave me more *bona fide* information as to the requirements of the trade than any amount of letter-writing would have done. Thinking a short account of my trip may be of interest to some of your readers, I send you a few notes of what I saw and ascertained while in Russia.

I intended leaving Leith by the S.S. *Petersburg* but was unable to leave London the day the steamer started and fortunate it was for me as after leaving Leith she had to lay two whole days in Aberleddy Bay, and after that had a fearful passage across the North Sea, arriving fully four days to five days late at Cronstadt—I went *viâ* Flushing, Hanover and Berlin to St. Petersburg by train. At Cook's office I got a second-class ticket for £9-10-10 which took me right through, and after a most comfortable journey, extending from 8 30 Wednesday evening till 6-15 Saturday evening. I arrived in St. Petersburg. The journey from London to Petersburg is full of interest to anyone who has never travelled that way before, for besides the charm of novelty there is so much to be seen of real interest.

The well cultivated canal-divided Holland has much sameness but is of great interest. Then in Germany one passes through varied scenery, and none of more interest than the Black Country where the coal and iron industries are carried out. This is entirely between Hann and Hanover; Berlin is reached 24 hours after leaving London; another 24 hours brings one to the Russian frontier, and another 24 hours St. Petersburg.

Once into Russia the temperature was sensibly a great coat, colder and at St. Petersburg with ordinary English winter clothing the cold goes right through one.

On my arrival I was fortunate enough to secure a most comfortable hotel, the Hotel de France. On the following morning, Sunday I started with a guide to find the S S. *Petersburg*, as she had then ample time to have arrived, but I had a wild-goose chase, for, after 4 hours' cruising up and down the river among the shipping, I ascertained that she would not come further up than Cronstadt. I can tell you I had a good taste of Russian cold, 15 degrees of frost in St. Petersburg in an open boat with no fur-coat is no joke, and I was right glad after cruising about for some time to see "Dundee" on the stern of a steamer, promptly called on the captain and experienced [illegible] hospitality in the way of a good hot Scotch, dinner but he also gave me a lift down to Cronstadt, as he informed me none of the Leith vessels came up further. Cronstadt is 23 miles down the river the Naval Arsenal and the harbour where, until the completion of the canal, all steamers were unloaded and loaded, the river not having deep enough water for heavy draught before the completion of the canal. Cronstadt is the key of St. Petersburg, and in addition to the real island there are several artificial islands on which fortifications are built. From what the older English inhabitants say Cronstadt ought to have been taken in the Crimean war, but by some mismanagement it was not. I did not find the *Petersburg* and was informed she would not arrive till Monday, so I returned by one of the river boats. Next day I returned to Cronstadt and found the *Petersburg* had arrived. I was thus able to get my box of samples. It would take longer than you would care to read, to narrate all the trouble I had to clear my box of samples. The difficulty lay in my having booked the box as passengers' luggage, and not having accompanied the box myself. However, I did at last get the box passed and I do not grudge the time spent, as I ascertained full well the intricacies of the working of the custom house. The duty on tea amounts to about 1*s.* 6*d.* (English money) per lb. Russian. A Russian pound is 10 per cent less in weight than an English pound. The duty *must* be paid in gold. The authorities will not accept their own notes not even if you offered, lemon may be added, and all the teas have a more or less artificial aroma, which must have been added by either dried Gardinia flowers or dried lime leaves. As I said, I cannot speak with certainty, but I believe our inferior tea would suit Russia well, and the flavour now in their teas could, I believe, be easily added in Ceylon if requisite. For their disposal, I enclose memo, of samples brought from Petersburg with prices attached. Next mail I will give you London values. It is extraordinary the quantity of tea which is drunk in Russia and the tea shops in Petersburg and Moscow are as numerous and well distributed as the public houses in London. I visited Moscow but having only one day there I could not find time for seeing the Cremlin and other objects of interest. However, I found out all I wanted about tea. Already some Indian or Ceylon tea has been sold in Moscow, imported by a young English man and with a mixture of China has sold well. I mention Indian or Ceylon as he was not certain which it was. He bought it in London from a firm I know. The translation of the Russian advertisement with reference to the tea is as follows:—

Newly Received
Tea from India.
The crop 1886,
Commenced to be sold at
Roubles 2 per lb.
2·20 Koopecks*
3· sold in 1 lb., ½lb, and ¼ lb. packages.

Indian tea under the name of Kakwyan (a place in India) is distinguished by its aromatic and soft taste and surpasses the Chinese.

Customers outside the town may buy through the post office. All orders executed by

P, Bycloff & Co.
Moorsuskeen,
Moscow.

Of course, there will be for some time a prejudice against Ceylon and Indian tea, but that will soon be overcome as in England. A good deal of tea comes from China overland to Moscow and with that means of transport we can certainly compete.

List of prices of teas I brought as samples:—

Petersburg Teas. No.	Roubles.
1	8
2	6
3	4
4	3 04
..	2 64 x
6	2·40
7	2 24
8	2
9	1 84
10	1·60 xx
11	1,20 Brick tea not much used.

Moscow Teas. No.	Roubles.
1	2 68
2	2 20 (0)
3	2·
4	2·
5	5·80 (00)
6	1·40

12 Spurious tea made from a shrub growing in Russia used for mixing 10 k. per lb. Not allowed by Government.

x x x These teas in principal use in Petersburg.

(0) (00) These teas in principal use in Moscow.

I returned by sea from St. Petersburg, stormy across the Baltic, but fine in the North Sea.—Yours faithfully,

G. D. ELPHINSTONE.

—*The Tropical Agriculturist.*

BRICK TEA.

(BY THE PERIPATETIC PLANTER)

PERMIT me to discuss your very interesting article upon "Brick Tea" in your issue of the 28th December in which you are good enough to enter at length and in detail into my views as to the future of a trade in Indian Brick-tea with Thibet. With that article I have no reason to be other than content, the more so as in accepting T. T. Cooper's statements, you afford me the opportunity of pointing out a by no means solitary instance of the unreliability of that authority. Perhaps no traveller has done so much harm as T. T. Cooper to our trans-frontier trade and exploration I could indite him on many points, and that too, partly, from personal experience, but here I have only to deal with one, and will confine myself to that one, to wit—his misstatements about Thibet as

* A koopeck at present exchange is about 1/4d it is really 1/100 of a rouble,

regards Brick-tea. These are sufficiently numerous and it must be borne in mind that he *never entered Thibet* and that *he could neither hold converse in Thibetan nor in Chinese*. His education was such as an average non-commissioned officer may boast, and his training for observation in foreign travel was limited to that gained by his own experience. You give in your article reasons, which would be cogent if based on reliable authority for questioning whether there really is any practically accessible market for brick-tea open in Thibet. These reasons are based upon the idea that the tea trade in Thibet is virtually an official monopoly. You speak of the extreme jealousy of the Lhassan authorities regarding the introduction of Indian tea. You speak of a heavy fine being imposed on any found trading in Indian teas. You show how the sale of tea is forced in Thibet in a peculiar way. How the Lhassan Government issues a certain quantity of tea to the Governor of each district in the various provinces, for "which tea he has to remit a certain fixed sum yearly in addition to the ordinary revenues of his district. His own salary and that of his subordinate officers is paid in tea." You further show that "almost every family is obliged to take some tea, only the very poorest, from whom payment in cash cannot be squeezed, being exempt. The profit made by this monopoly is, of course, a most cogent reason for the official prejudice against the introduction of Indian teas, and accounts for the severity of the rules against introducing it, and for the heavy fines levied on any one found trafficking in it." Certainly it would be a most cogent reason, did such monopoly exist But what authority have we that it does exist? other than T. T. Cooper's. I confess at once I know of none other, and should such other exist it must be weighed against the one I shall presently advance, and the balance of reliability be adjusted accordingly. It is one grave impeachment that one has to bring against the Government of India that it does not keep the India Office here supplied with reports and documents which most assuredly should be so supplied. Thus I have searched at the India Office in vain for any of Mr. Ney Elias's reports, and up to the moment of writing this I have not discovered Narain Sing's full reports—though this may in the course of time be discovered. In the paper read before the R. G. S. by General Walker upon Narain Sing's journey, only geographical points are touched upon, so I could learn nothing commercial from that abridged report. My friend Mr. Ney Elias I hope to see in a few days, as he is now at home.

Meantime I am thus compelled against my best endeavours to remain in the dark as to your authority—it not being mentioned in your article—and if it should not be, T. T. Cooper accept then or not my authority as against yours, solely upon the probability as to which can claim the greater experience and the *greater* facility for knowing the truth. The statements you make so closely resemble T. T. Cooper's that the refutation I am about to quote although addressed to T. T. Cooper's statements will apply to yours. My authority then is Rev. Abbé Desgodins who has resided in Thibet, who has passed a quarter of a century on the Thibetan Frontier, who speaks both Thibetan and Chinese with equal facility, who has read every work of any merit upon Thibet and who has had a special training at his college and vast experience in observation and in accumulating notes on foreign travel. He is at this moment close to the Thibetan frontier, engaged in translating, printing and publishing Christian tracts, &c. in Thibetan. He has frequently personally insisted in long conversations I have had with him, that there is *no legal monopoly* of the sale or disposal of tea in Thibete. Here are the Abbé's printed words:—After estimating from Chinese custom house returns, &c. the import of tea into Thibet, to be 3 466,640 English pounds, he proceeds as follows:—"Geographers are unanimous in estimating the population of the Thibetan countries at 6,000 000 souls. Dividing the great grand total of 3,466 640 lbs. by 6,000,000 tea-drinkers we arrive at the curious, but nevertheless true, conclusion *that every Thibetan gets for his yearly consumption only six-tenths of a pound of tea*." The italics are his. If this computation is correct, the "monopolists" to say the least, make but poor use of their monopoly, and it is not going too far to say that there seems scope for a considerable increase in the imports. Continuing in the Abbé's words:—"*The supply coming yearly from China is barely enough for the demand in the eastern province of Thibet*. To our Indian planters ought to belong the right of supplying the other provinces, and this without injuriously affecting the Chinese market, &c." The italics are gain the Abbé's. Continuing again: "If loads of smuggled tea are stopped at the frontier by the Chinese and Thibetan custom houses, they will not be destroyed, but sold to the people for the benefit of the custom officers, who will became *ipso facto* instruments in introducing India tea into the interior of Thibet proper. Following the smuggling of tea across the frontier will come the open trade. When the tea-drinkers and merchants of the provinces of Negaie, Tsang, and Oui know that, for about the same price given at Ta-tsien-loo (in Szechuan in China) they can procure near at hand this same tea which they like, and which they are compelled to import from long distances, it is probable that they will resort to the nearest market thereby saving the increased cost of transport, and consequently increased price. At first the long established custom will prevail to some extent, but only for a time; any prejudices there may be will not stand long against self-interest stimulated by the demand for tea. If piece-goods merchants, uniting their efforts with those of the tea planters, could offer to the tea buyers *coarse but strong* cotton cloth, white or tinged dark blue indigo colour, this last in quantity, they would find a large market for their goods." Regarding the so called Chinese monopoly, the following remarks may be of interest:—Here speaks the prophet again:—"Up to this time the Chinese keep in their hands the monopoly of Thibetan tea trade, because the whole of Thibet is, though reluctantly, tributary to, and to a great extent civilly administered by, China, and because until now no attempt has been made at serious competition. But *it is not true*, as stated by T.T. Cooper, that the Chinese mandarins sent to Thibet, and the Lamas, retain that monopoly in the interior of the country, When Chinese mandarins, *in charge of the troop and of the Lamas' pay* receive their allowance, they generally expend at Ta-tsien-loo (the town in Szechuan in China, where duty on tea is paid before the tea enters Thibet) part of the money entrusted to them, in buying tea. This tea is conveyed (to Thibet) at the expense of the people, as extra duty, and given as pay to the soldiers, and even to the Lamas at the price current in the interior, according to the place. The conveyance having cost nothing, and the price being three fold or four fold higher than at Ta-tsien-loo, the mandarins realise by this means considerable profits for themselves in which the Government does not participate. It is a private not an official speculation * * * *Any* one (not European) *with money goods, and means of conveyance at his disposal, may come to Ta-tsien loo buy as much tea as he can from the Chinese merchants, carry it to any part of Thibet and sell or exchange it, without being liable to pay any sort of toll, or encountering on his road any custom-house, or being subjected to any restrictions whatever*. Free trade is the rule, or at least the custom, in Thibet, (once the frontier is passed) and the tea trade forms no exception. These being facts, it is evident that Chinese monopoly of the tea trade does not extend beyond *the interior* of the town of Ta-tsien-loo. As soon as tea has passed through the northern or southern gates, and paid exit duty, monopoly, either Chinese or Lamaic, ceases to exist.

If the Chinese and the Lamas reappear at our frontier, it is on account of their fear of our competition but *specially* owing to the dread that if a trade in tea spring up between Thibet and India, the people of Thibet would learn to appreciate and wish for the more enlightened rule with which India is blessed. It is neither Chenese tea nor European goods of any descriptions which are feared, by the Chinese or Lamas, but Englishman and Europeans.

Hence my observations in a previous letter upon the use of intermediaries for this transfrontier trade There, sir, could you have had your points taken up one by one in a more categorical manner had the Abbé sat down to reply to your article himself, instead of having written those words as he did, five years ago! I leave them as they stand, to be weighed and measured by the value attached to him as an authority upon affairs Thibetan, without further remark from me than this, that his account of the traffic by mandarins whom we should call pay-masters, seems a very plausible foundation for the erroneous stories current about official trading and official monopoly As to the issue by the Jongpan and forced purchased by the people, referred to in your article I hold in a letter from Mr.Ney Elias, received since writing the above an equally plausible foundation for that possibly equally erroneous story, but as I have already exceeded my space, I must hold that item over. I trust in the interest of Indian planters that this discussion may not be allowed to drop till due attention has been drawn to the subject and so much of the truth has been elicited as is possible under existing conditions.

NOTE.—We take it that the Peripatetic Planter is quoting the small pamphlet published, in 1882, and circulated by the Bengal Government, We shall be glad to have this question of a Thibetan market for Indian tea sifted to the bottom.—ED *Indian Planters' Gazette*.

WARM WATER FOR CATTLE.

THERE are few persons, writes a well informed agriculturits in an English daily, acquainted with cattle feeding who would not be disposed to admit that warm water would be found more beneficial to drink than cold water, more especially at the present season of the year. It is not sufficiently known that to give cows water to drink which is ice cold is practically to rob them of a portion of their food. In other words the effect produced is similar to that which would result from depriving a beast of a portion of its accustomed ration when it was drinking water daily at a normal temperature such as 60 or 70 degrees. The temperature of the body of a beast is close upon 100 degrees and this state is maintained by the food or fuel which is constantly given to the beast and consumed. Anything, therefore, which is calculated to lower the temperature is detrimental to its maintenance especially as it has to be heated up by the body to its normal state. The question may be put in another form. Given a boiler under which a good fire is burning by means of the food or fuel which is constantly given it; if a quantity of cold water is suddenly dashed upon this fire the action is immediately felt by the water in the boiler, especially if the steam is being used and more fuel may be immediately necessary to bring about and continue a similar state of things to those which existed before the water was thrown on. Nature comes to the assistance of the beast, but inasmuch as a demand is made upon the system in order to heat the cold water which has been drunk, there is less available material for the production of milk or meat

There appears to me to be no reason why if summer conditions can be as much as possible carried into winter, we should not get summer receipts from dairy cows. Grass we cannot produce for a winter ration, but we can do the nearest thing and provide a succulent and rich food which will answer almost as well Good feeders recognise this fact, but they too often prevent their own success by not noticing the influence of the temperature both of the air and of water. Add to a good ration equivalent to that of the summer water of 65 degs, and a cow-house of 65 degs., aerated as far as possible, and we shall find that the cattle will approximate in their yield as nearly as possible to their summer returns.

A large portion of the food consumed by beasts is known chemically as carbonaceous food or carbo hydrates. These form a special constituent, and are consumed by all cattle in a larger quantity than any other constituent, Where cows and any other kind of beast are kept in a warm,

equal temperature, they require much less of those same carbonaceous foods than if they are allowed to drink ice cold water, and to stand in stables which approximate to freezing point. Just as carbonaceous food is a heating food, so does the beast require more of it when there is more heating to be done. An experiment was made at the Agricultural College at Kansas last winter in order to test the results of feeding upon warm water, and although there is great difficulty in formulating a plan to accurately arrive at the result, which is beyond dispute, the warm water gave 8½ per cent more milk during the 20 days of the experiment than cold water taken direct from the well.

In this experiment warm and cold water were given on alternate days; but, with the American critic of the experiment, I believe that this would not show so favourable a result as if the animals had been given warm water continuously for a given time, and the results compared with those which followed the consumption of cold water necessarily of a very low degree. I am willing to admit that, as in the case of cooking or steaming food, it is difficult to conduct work of this kind where only a few cows are kept, inasmuch as the expense is as great on account of labour, as where a large number are kept. It is quite true that in the case of a single cow, or two or three cows, a kettle of boiling water added to the drinking vessel twice daily would probably be sufficient, but in ordinary dairies with a number of cows special arrangements would have to be made for heating. The question, therefore, is—Would the increase in the milk or in the meat be more than an equivalent to the extra cost entailed in heating? I think it would, and the figures which follow bear out my belief. The same question might be put in the case of improved feeding. Does cooking pay? Does steaming pay? Does high feeding pay? In each case the cattle owner must satisfy himself by practical experience. If, for example, the labour entailed by either one of these systems cost an extra man, who is paid 12s. per week, it would be quite satisfactory if the return were 15s in excess of what it was. The more it is, of course, the better for the farmer; but even though the outlay be exceeded, there would be no cause for complaint.

DAILY MILK YIELDS IN LBS

Dates of Experiment.		Warm Water.	Water direct from Well.
Feb.	9	—	74
,,	10	81	—
,,	11	—	75
,,	12	86	—
,,	13	—	78
,,	14	84	—
,,	15	—	80
,,	16	87	—
,,	17	—	81
,,	18	90	—
,,	19	—	82
,,	20	90	—
,,	21	—	85
,,	22	90	—
,,	23	—	92
,,	24	89	—
,,	25	—	75
,,	26	89	—
,,	27	—	81
,,	28	85	—
Totals		871	803

Total increase in milk while warm water was used ... 68 lbs

Total increase per cent in milk while warm water was used — 8.47

BUTTER-MAKING.

TWENTY years ago (says 'H. R.' in the *Dundee Advertiser*) Irish butter was largely used in this districts, but when about 1870 the Danes began to devote attention to butter-making they produced an article so superior, that consumers soon acquired a taste for it, and refused longer to use the sloppy make and slovenly got up production of the Irish. Since then the supply of Danish butter has increased tenfold, so that it is now almost their only export, grain being used for feeding the cows, and the price has gradually advanced till of late years the Danes have realised 30 per cent. over that paid for Irish. In June 1885, I spent my holidays in Ireland, journeying from Belfast to Cork, being introduced to many agriculturists of all stations—seeing their ways and giving them information as to improved methods—which in some cases were taken up with earnestness.

I may mention that when there I saw several attempts at the Danish system—one near Limerick and another near Cork—the latter most expensively got up—indeed, so much so that any proprietor or farmer of moderate means who might visit it would return home convinced that it was too much for him to attempt; and so in drawing up the following I have kept in view economical methods, which, if applied with common sense, may produce the best possible results in butter making. I had intended sending this to Ireland direct (in accordance with a request from some of the farmers whom I saw last year) but it occurs to me that some of our Scotch farmers may be pleased to have some hints from one who has hoped to improve butter-making in other countries.

Some will ask why such strenuous efforts to awaken interest on this subject? I answer because properly made butter is the easiest of all fats to assimilate with the human body and therefore one of the healthiest of foods, and of the greatest importance to delicate or weak digestions; and next, we send annually out of this country about £12,000,000 sterling for butter, and for all dairy products together £15,000,000 to £20,000,000 sterling which, if kept in the country, would gradually the wasted fortunes of our home agriculturists

FEEDING.

In winter the food for each cow should be 1½lbs. rape cake, 6lbs. crushed oats and barley, 4lbs. coarse bran and ½lb salt. This is to be mixed altogether and given in equal proportions as a drink before milking. The best way is to soak it in a little boiling water for five minutes, then reduce with cold water to a drinkable consistency. Roots, 45 lbs (mangold or beet preferred). Turnips are apt to make the butter taste, but it is said this can be avoided by putting a piece of nitre the size of a pea into the milk pail before milking; also liberal supply of hay and straw, meadow hay preferred. In my opinion it is better when turnip is used to reduce the quantity and increase the supply of corn and hay. In summer the food should be plenty of grass and some meadow—hay or straw, and for a drink 4lbs. crushed oats and barley, 1lb. coarse bran, and ½lb. salt, prepared and given as before.

MILKING.

The cows should be milked clean. The sample of first drawn milk shows only 3 per cent of cream, while the last drawn shows 52 per cent milk should not be allowed to stand in the cowhouse till the last of the cows are milked as when warm, the milk is specially liable to atmospheric influences.

PREPARING FOR CHURNING.

If the milk is cooled as quickly as possible after being drawn, it runs less risk of souring. Skim after being twelve hours milked and run the cream through a sieve. To every 100lbs cream add 5lbs churn milk. Keep at a temperature of about 60 degs. Fah. (a few degrees higher in winter) for about twelve hours stirring occasionally with a wooden spoon. Should the temperature fall surround the vessel containing the cream with hot water, if too high with cold water till it is brought to the proper heat. Churn at same temperature, for if allowed to go higher, the butter will be too soft. If colouring is required it is better to add a few Guernsey cows to the herd (say one to ten) thus securing increased colour and more waxy texture.

CHURNING.

The churning should be done moderately quick till the butter appears about the size of grains of wheat. Now add a little cold water (not iced) and churn three to five minutes longer, then run butter milk through a sieve close enough to catch all the particles of butter, adding cold water (not iced) gradually till it runs off clear all the time pressing the butter with a large wooden spoon. The bulk of the churn milk can be run off before much water is added.

CURING.

It is then rolled with a fluted roller on a sloping table and 3 per cent of salt added. This is very mild cured, but for export it should be 4 per cent.; work it over with the roller four times, and let it stand three quarters of an hour; roll over four times again, when it is ready for packing.

REMARKS.

At no time during the whole process should the milk or butter be touched with the hands, but only with the wooded spoon and roller.

It sometimes occurs (especially in hot weather) that the butter is heavy tasted—that is, it lacks perfect sweetness. When this occurs the churned milk should not be used for souring the cream, but it should be allowed to sour of its own accord. By this means untainted churn milk is again secured for souring, for this reason bakers have occasionally to change their yeast or make it new. The salt should be free of lime and other alkalies. Milk skimmed at twelve hours will retain a little cream, but it is better to be left—from experience I find the last thrown up cream developes bitterness in the butter.

Cleanliness and regularity are of the first importance, and all dishes and implements must be scalded with boiling water, and washed with cold before being used. If a croaking sound is not produced by pressing the finger across the dishes they require to be scalded to remove some residuum of the old milk. Cow-houses should be thoroughly lime washed twice a year.—*North British Agriculturist.*

SOAP-MAKING IN RUSSIA.

DURING the last ten years the manufacture of soap has become an industry of importance in Russia. In almost every important town of the Empire there are now soap-works which supply the requirements of the locality. The crude materials from which the bulk of the common soap is made are soda and tallow, the latter being prepared from crude mutton and beef grease, substances which are available in abundance. There are in Russia 521 tallow factories employing nearly 4,000 hands and producing together about 56,000 tons of tallow annually, of which about 32,000 tons are consumed in the manufacture of candles. Among the ingredients which are used in the manufacture of the better grades of soap may be mentioned cocoanut oil, palm oil, whale oil, fish grease, seal oil, bone-marrow, linseed oil, hemp oil, cotton oil, olein, shellac, and different varieties of colophony. The soaps made with shellac are mostly consumed in cotton and net-lace mills; the soda soaps in spinning mills, cloth factories, and dye works. The Russian process of soap-making is, on the whole, an exceedingly primitive one. Steam power is employed only in the manufacture of toilet soap; makers of common soap use cauldrons and pans over an open fire.

In recent years oil mills have been established at St. Petersburg, Riga, Libau, and Odessa, which are principally engaged in expressing cocoanut oil. This industry has given a considerable impulse to the manufacture of cocoanut soap, which dissolves even in dirty water and is adapted to almost every use to which soap can be put.

The rapid extension of the Russian railway system will soon enable all Russian soap works to employ cocoanut oil as an ingredient of manufacture, and the time is probably near when the bulk of the soap used in Russia will be manufactured from cocoanut oil and tallow. Already in many places, which have recently been brought within railway communication, fish grease and seal oil have been discarded.

Olein and shellac are principally used by Moscow and Warsaw soap-makers. Amber, glycerine, resine, carbolic acid, and eggs have recently been added to the Russian soap stock. Soap made with eggs is annatto coloured. Castile soap is largely used in dyeing and printing. This soap is made from olive oil, and is free form ley salts; it is not manufactured in Russia, but imported from Marseilles. In St. Petersburg and Odessa experiments have recently been made to manufacture soap from the fatty acid obtained from glycerine-free tallow and cocoanut oil, but the decline in glycerine value put an end to these experiments. The cheapness and abundance of earth oil in Russia have also given birth to the idea of employing this material as soap stock, and experiments, are now in progress which may, if successful, revolutionise Russian soap manufacture. The number of soap works in Russia is about 300 producing 65,000 tons of soap annually, one-half being contributed by St. Petersburg Moscow, Odessa, and Riga.

Among the soap imported from abroad, a German article, made by the firm of Eschweger from tallow and cocoanut oil leads the way. Messrs. Eschweger make a speciality of the production of a brightly coloured and nicely marbled article, advantages which depend not so much upon the quality of the material used as upon the dexterity of the workmen.—*Chemist and Druggist.*

CHEDDAR CHEESE-MAKING.

Mr. Henry F. Moore, Frome, Somerset, writing to the leading journal, says :—Our farms are equipped for cheese making, and in most farms the farmers' wives and daughters make the cheese. To utterly displace this invested capital and this cheap productive labour would be an economic mistake I believe, and therefore I am no advocate of the factory system.

I am strongly of opinion that a most useful work can be done in the matter of raising and improving the quality of the great bulk of Cheddar cheese made in this country by finding out the very best methods adopted in various parts of the world. There is an appropriateness in trying to make an attempt in this direction in the Jubilee year of Her Most Gracious Majesty's reign When the Queen came to the throne 50 years ago the manufacture of Cheddar cheese was very much in the position that it was when Camden wrote of it in the reign of Elizabeth, or when Fuller described it in the 17th century. The latter said that 'the worst fault of Cheddar cheese is that they are so few and so dear, hardly, to be met with save at some rich man's table' During the reign of her Majesty the Queen, Cheddar cheese has extended from a very small district in this county over the greater part of the west of England, as well as to several spots in other parts of the same country. It has spread to Scotland, and has become the great rural industry of the dairy belt in that country. In Holland, Russia, and Germany it is made in large quantities, while it reigns supreme over the whole of the vast continent of the United States and Canada. In New Zealand and Victoria it is the principal cheese manufactured, and probably this is true of the whole of that Oceania of which the mother country is so proud. All this spread of the Cheddar system has occurred during the reign of our gracious Queen and as it cannot but be a usual work to further help on the movement by obtaining good information as to the principles which underlie success from every part of the world, I think that the Jubilee year of Her Most Gracious Majesty might be well used for the purpose.

My suggestion is this, that the sum of £200 might be raised for a 'Jubilee Cheese Cup,' to be offered next September at the Frome Show for the best cheese made on the Cheddar system in any part of her Majesty's dominions, each competitor to send a detailed and complete report on his or her system of manufacture. I would have these reports afterwards handed to the Department of Agriculture at Whitehall, and as many as were found useful to be issued by that Department for the benefit of the cheese making of the Empire I think, if we wish to tempt the best exhibitors from the Antipodes and other parts of Greater Britian beyond the seas, that a cup of that or even higher value should be given. As arrangements for such a contest would have to be made at once, it is worth while seeing if funds for it could be raised.

I think, sir, that a manufacture of something like 135,000 tons of cheese (a lowish estimate) takes place annually in this country All round this does not fetch to the producer more, at the very highest, than £50 a ton, while it is possible for the best of it to make up to £65 a ton—a difference between the average and fair possibility of over two millions sterling a year. If the average could be increased only £5 a ton, it would mean something like £660,000 put into the pockets of our home cheese makers annually. But if we also add the benefits that might accrue to the cheese makers of the other parts of the Empire, it will be seen that there is a possibility of a great work being accomplished at a little cost. I believe that such a contest would bring out the best and most practical experience of cheese-making in the whole world, and that it would be a useful tribute to one of those almost unknown reforms with which her Majesty's beneficent reign has been so blessed.—*North British Agriculturist.*

FODDER AND FEEDING.

By Dr. A. P. Aitken.

In a great many of the experiments conducted in Germany for the purpose of advancing our knowledge of the laws of animal nutrition, dogs were chosen as subjects for experiment. The dog is naturally a carnivorous animal, and the food which it eats and the nature of its digestive apparatus differ much from those of the animals which are fed for human consumption. It might, therefore, seem a rash proceeding to use the information derived from the feeding of dogs for the purpose of explaining the laws of nutrition as concerned in the feeding and fattening of farm stock. But we must bear in mind that however different may be the kinds of food that are natural to animals there is no difference in the nutritive constituents of the food. Whatever the name of the food may be, it derives its value solely on account of containing in greater or less proportion the essential constituents of all food, namely, albuminoids, fat, and carbo-hydrates; and that whatever may be the differences exhibited by these substances in the food, yet when they have undergone the process of *digestion they are absorbed into the body in the same forms in all animals*. According as the raw material differs in its external characters, the digestive apparatus is fashioned in such a manner as to extract from it most effectually the nutritive matter it contains, and convert it into albumen, oil, and grape sugar. Therefore, in investigating the general laws of animal nutrition choose for their subject any animal that is easily put under control. The differences that exist among animals as regards their nutrition are differences in degree rather than in kind.

Thus, as was mentioned in the former chapter, a dog getting as food parts daily with 18 grains of dry albumen for every 1,000 grammes (2 1-fifth lbs.) of live weight. This, its natural albuminoid waste. It represents about 37 grains of actual flesh, so that a dog weighing 50 lbs. will lose daily about a quarter of a lb. of actual flesh, or about half a per cent of its live weight, independently of loss by respiration, &c. An ox deprived of food loses flesh in a less proportion to its weight, viz. about one-sixth per cent: so that an ox weighing 1,200 lbs. will lose daily about 2 lbs. of actual flesh. If, in looking for an explanation of this difference, we examine the composition of the two animals, we shall find that the body of the ox contains a much larger proportion of fat than does that of the dog, for the ox is an animal having a natural tendency to fatten, and the explanation suggests itself that this excess of fat may have something to do with protecting the flesh from wasting. This is a matter which can very easily be proved by experiment; we have simply to try whether a fat dog or ox, when fasting, consumes its flesh less rapidly than a lean one. That has been proved over and over again so that it has become a well established fact that an accumulation of fat in the body diminishes the amount of daily nitrogenous waste, and thereby enables the animal to make better use of its food—to put on flesh more easily. It is with men as with other animals, and it is a matter of common observation that a fat man eats less in proportion to his weight than a lean man does—he eats less albuminoid food, but he makes a better use of what he eats.

The next question that arises is, does fat given in the daily food exert a similar influence in diminishing the amount of albuminoid waste, or in enabling an animal to make better use of the albuminoid matter of its food? Professor Wolff instances the case of a dog, weighing 60 lbs, which was put on a diet of one pound of raw flesh containing no fat, and the animal became daily leaner, until it approached starvation point. In order to maintain a dog of that size in fair bodily condition, about 3 lbs. of flesh would be necessary. When, instead of getting 3 lbs, it received only 1 lb. of flesh along with about half a pound of fat, it rapidly throve, and attained a strong, healthy condition of body. It recovered its former weight, but that increase of weight was not due to the laying up of fat in the body; it was due to the making of flesh. The quantity of albuminoid matter contained in the flesh was sufficient not only to supply its daily flesh-waste, but also to leave a residue that went to increase the animal's tissues. By giving half a pound of fat along with the pound of flesh, the same amount of nourishment was afforded as would have required 3 lbs. of flesh alone, so that the expenditure of half a pound of fat saved the expenditure of 2 lbs of flesh in the food. It is not to be supposed, however, that if the dog had received half a pound of fat daily along with the 3 lbs. of lean meat, that than the 2 lbs. of flesh in excess of what was required to maintain its bodily condition would have absorbed and stored up in the animal's tissues. That does not by any means follow, for when albuminoid matter is given in excess of the animal's requirements it goes, in the first place, to increase the amount of circulating albumen in the body, and the daily decomposition of this in the body, increases proportionately the amount of albuminoid waste. The amount of albuminoid waste in the animal body increases directly with the increase of albuminoid food and the simultaneous addition of fat to the albumen of the food after the limit of that substance required to maintain the animal in condition is passed, does very little to protect the albumen from wasting. This experiment with the dog exhibits, clearly the following fundamental facts, that in the daily food of an animal a certain minimum of albuminoid matter is required to repair its nitrogenous waste. If that quantity is much exceeded it causes the corresponding increase in the nitrogenous waste, and thus valuable albuminoid food is simply thrown away, If however a certain amount of fat is added to the food the animal is content with less albuminoid matter, and thrives as well or even better, It is, therefore, an important matter for the feeder to know what is the most economical proportion of fat to albuminoids in the food, so that the animal may go on slowly increasing in flesh without unduly increasing the daily amount of its nitrogenous waste.

In the natural food of farm stock there is very little fat. The great mass of non-nitrogenous constituents of their food consists of carbo-hydrates, and it is far more important for

the farmer to know what effect these have in relation to the albuminoid part of the food in enabling the animal to increase its weight and maintain its health than to know the effect of fat in that respect. It has been found, as the result of great many experiments on all kinds of domestic animals, that the carbo hydrates (starch and sugar) act even more powerfully than fat in diminishing the amount of albuminoid waste in the animal body, and in enabling the feeder to exercise economy in the use of albuminoid food. In the case of the dog, above refered to, it was found that one pound of flesh, when given along with half a pound of fat, was as efficient a diet as three pounds of flesh without it, but the same result, or even a better one, was attained when half a pound of sugar was given instead of the fat. When we consider how much more carbonaceous a substance fat is then sugar, this result cannot fail to excite our surprise—certainly we could not have anticipated it. Sugar and fat have both been referred to in a former chapters as respiratory or heat producing foods, that is to say, substances which when burned in the blood produce heat, and enable the animal to maintain its high temperature. In this respect fat is more than twice as efficient as sugar, for one part of fat requires as much oxygen to burn it as 2 44 parts of sugar. Accordingly, when we are estimating the value of fat along with starch or sugar as a heat producer, we multiply the amount of fat by 2 44 (its starch equivalent), and add it in along with the amount of the carbohydrates; but we see here that starch and sugar have another important function to perform in animal nutrition besides the respiratory one, viz. that of reducing the amount of albuminoid waste, and that in this respect they are in no way inferior to fat.

This is an important matter, from an agricultural point of view, for it shows that by means of cheap and easily digested carbo-hydrates the feeder is able to produce the same flesh preserving effect as he can by means of a like quantity of oil, which is not only dearer, but less easily digested, and not able to be given in large quantity to farm stock without the risk of injury to the digestive functions and the general health.—*North British Agriculturist.*

PLEASANT MEDICINES.

[BY A PHYSICIAN.]

PEOPLE dislike a bitter, nauseous taste, even when well, and it is only natural that they should do so much the more when they are ill. Upon this rock, more than anything else, perhaps, has homœopathy been founded. Now, the selection of food is regulated almost entirely by the taste. Unpleasant foods are excluded from our tables. As we are so extensively governed by the taste in health, it is somewhat remarkable that this should have been taken so little into account in disease. The advance from administering dried and powdered herbs, and herbs steeped and in infusions, to the present status of improved pharmacy, whereby the physician need seldom offend his patient's palate and stomach, is in consonance with the laws which have made our every day dietaries what they are.

To give an invalid patient, restless, nervous, and weak, "mixtures" which excite repugnance, will often add to his misery instead of mitigating it, as should be the office of every true physician. It is not an uncommon thing to see infants thrown almost into spasms when an effort is made to compel them to take a disagreeable, nauseous, bitter, or pungent medicine the second or third time. Those who have been much about the sick can hardly have failed to see patients, stricken with disease and sinking fast, turn their head away from medicines which were intended to cure, but were seen to repel. It does not seem dogmatic to say that it is almost as essential to consult the taste of some fastidious people as it is to select their medicine. We do not mean by this that every thing should be made subservient to the *taste* in treating disease. Not at all! Certainly, as a rule, the physicians who enjoy the largest practices are those who exercise as punctilious a care in disguising unpleasant, remedies as they do in marking out an acceptable invalid diet. Every removable factor in medication which might be suggestive of unpleasantness should always be eliminated; medicines should never be given from dirty or unseemly bottles, nor be unsightly in themselves.

Some of the most unpalatable drugs are among the most efficient. The first efforts of pharmacy were directed to extracting in as pure a form as possible the active principles of plants, and to the general purification of drugs. To the present, however, more than to any other time, belong the improved methods of administering many highly essential medicines in such form that their objectionable characteristics are largely diminished or completely removed A very eligible form, indeed, for taking many unpleasant restoratives, tonics, alteratives, &c., is the *Elixoids.* These very satisfactorily disguise every unpleasant quality, and possess an agreeable, delicate flavour which is generally liked very much, or, at least, pronounced rather pleasant.

Take, for example, Valerian—a most useful and efficient remedy in nervous and hysterical patients; yet how disagreeable! Taken in the Elixoid of Valerianate of Ammonia, the preparation will be found an elegant one, and the objectionus ordinarily attendant upon Valerian to disappear. It quickly controls the symptoms, and quiets the nervous system. It can be used continuously, and leaves no unpleasant after effects whatever. It is a mild and healthy stimulant to the nervous system and is efficient in the nervous further bations occurring in uterine derangements. In *globus* (called "ball in the throat"), in palpitation, nervous erythism and spasms neuralgia, hypochondriasis, and flatulence, it action is immediate and decided. Those subject to nervous attacks should always have it near at hand. A table-spoonful of it may be taken as required.

In the pleasant form of *Elixoids* such remedies as quinine, strychnia, iron, the bromide of potassium, potassium iodide with mercury biniodide, &c., may likewise be taken with the greatest advantage in those cases where such medicines are required.

A WOMAN'S SUFFERINGS AND GRATITUDE.
A VOICE FROM AUSTRIA.

Near the village of Zillingdorf, in Lower Austria, lives Maria Haas, an intelligent and industrious woman, whose story of physical suffering and final relief, as related by herself, is of interest to English women. "I was employed," she says, "in the work of a large farmhouse. Overwork brought on sick headache, followed by a deathly fainting and sickness of the stomach, until I was unable to retain either food or drink. I was compelled to take to my bed for several weeks. Getting a little better from rest and quiet, I sought to do some work, but was soon taken with a pain in my side which in a little while seemed to spread over my whole body, and throbbed in my every limb. This was followed by a cough and shortness of breath, until finally I could not sew, and I took to my bed for the second, and, I thought, for the last time. My friends told me that my time had nearly come, and that I could not live longer than when the trees put on their green once more. Then I happened to get one of the Seigel pamphlets. I read it, and my dear mother bought me a bottle of Seigel's Syrup, which I took exactly according to directions, and I had not taken the whole of it before I felt a great change for the better. My last illness began June 3rd, 1882, and continued to August 9th, when I began to take the Syrup. Very soon I could do a little light work. The cough left me and I was no more troubled in breathing. Now I am perfectly cured. And oh, how happy I am! I cannot express gratitude enough for Seigel's Syrup. Now I must tell you that the doctors in our district distributed handbills cautioning people against the medicine, telling them it would do them no good, and many were thereby influenced to destroy the Seigel pamphlets, but now wherever one is to be found, it is kept like a relic. The few preserved are borrowed to read, and I have lent mine for six miles around our district. People have come eighteen miles to get me to buy the medicine for them, knowing that it cured me, and to be sure to get the right kind. I know a woman who was looking like death, and who told them there was no help for her, that she had consulted several doctors, but none could help her. I told her of Seigel's Syrup and wrote the name down for her that she might make no mistake. She took my advice and the Syrup, and now she is in perfect health, and the people around us are amazed. The medicine has made such progress in our neighbourhood that people say they don't want the doctor any more, but they take the Syrup. Sufferers from gout who were confined to their bed, and could hardly move a finger, have been cured by it. There is a girl in our district who caught a cold by going through some water, and was in bed five years with costiveness and rheumatic pains, and had to have an attendant to watch by her. There was not a doctor in the surrounding districts to whom her mother had not applied to relieve her child, but every one crossed themselves and said they could not help her. Whenever the little bell rang which is rung in our place when somebody is dead, we thought surely it was for her, but Seigel's Syrup and Pills saved her life, and now she is as healthy as anybody, goes to church, and can work even in the fields. Everybody was astonished when they saw her out, knowing how many years she had been in bed. To-day she adds her gratitude to mine for God's mercies and Seigel's Syrup.

"MARIA HAAS."

The people of England speak confirming the above.

AFTER MANY YEARS.

"Whittle-le-Woods, near Chorley,
"December 26th, 1883.

"Dear Sir,—Mother Seigel's medicine sells exceeding well with us, all that try it speak highly in its favour. We had a case of a young lady that had been troubled many years with pains after eating. She tells us that the pains were entirely taken away after a few doses of your medicine.—Yours truly,

"E. PEEL."

AFTER SEVERAL YEARS.

"Stoke Ferry, January 9th, 1884.

"Gentlemen,—I have used Seigel's Syrup for several years, and have found it a most efficacious remedy for Liver complaints and general debility, and I always keep some by me, and cannot speak too highly in its praise.—I remain, yours truly,

"HARRIET KING."

AFTER SIXTEEN YEARS.

"95, Newgate-street, Worksop, Notts,
"December 26th, 1883.

"Gentlemen,—It is with the greatest of pleasure I accord my testimony as to the efficacy of Mother Seigel's Syrup. My wife, who has suffered from acute Dyspepsia for over sixteen years, is now perfectly better through the sole help of your Syrup. I have spent pounds in medicine from doctors—in fact, I began to think she was incurable until your marvellous medicine was tried.—I remain, yours thankfully,

"ALFRED FORD."

THE EFFECTS HAVE BEEN WONDERFUL.

"Ilford Road Dispensary, Dukinfield,
May 3rd, 1884.

"Dear Sir,—I am happy to inform you that the sale of your Syrup and Pills increases here continually. Several of my customers speak of having derived more benefit from the use of these than from any other medicine. In some instances the effects have been wonderful.—Yours very respectfully,

"Prof. EDWIN EASTWOOD, J. B."

(A)

[Registered No. 182.]

THE

INDIAN AGRICULTURIST.

A WEEKLY

JOURNAL OF INDIAN AGRICULTURE, MINERALOGY, AND STATISTICS.

VOL. XII.] CALCUTTA :—SATURDAY, MARCH 5, 1887. [No. 10.

Health, Crop and Weather Report

[For the Week Ending 23rd February 1887.

Madras.—General prospects tolerably good.

Bombay.—Reaping of late *kharif* and *rabi* crops going on in eleven districts. The condition of standing crops remains unchanged. Scarcity of fodder in one taluka of Dharwar. Fever in parts of ten, cattle-disease in parts of six, and small-pox, in parts of four districts.

Bengal.—No rain during the week. Cold weather is coming to an end. *Rabi* crops are generally doing well. Harvesting of pulses, oilseeds and sugarcane continues with good outturn. Poppy is in flower; it is backward south of the Ganges, but it is generally expected to be a fair crop. *Boro* paddy is being planted out. Indigo sowings have begun. Ploughing for early rice and jute goes on. General health is good.

N.-W. P. and Oudh.—Weather getting warmer. Injury to crops from frost and blight reported in several districts, but *rabi* prospects continue favourable. Poppy plants are in good condition. Sugarcane pressing in progress. Supplies are sufficient, though prices are rising. Public health good.

Punjab.—Slight rain in the Rawalpindi districts. Health generally good. Prices of food grains rising. Crop prospects average. Rain much needed.

Central Provinces.—Weather clear and becoming warm. Prospects continue generally favourable. Prices are reported to be rising in some districts. Fever and cattle disease in places.

Assam.—Weather seasonable, but getting warm during the day. Crushing of sugarcane and ploughing of land for *ahu* and *damahi* in progress. Reaping of mustard crop finished. Prospects good. Five deaths from cholera from Sadr, and one from Katigore reported, otherwise public health good.

Mysore and Coorg.—Standing crops in good condition, except in parts of the Chitaldroog district where they are affected by disease. Coffee crop reported to be light in the Kadur district. Prospects of season favourable. Public health good. Prices risen slightly in the Tumkur and Mercara districts.

Berar and Hyderabad.—Weather getting warm. Wheat is being gathered. Threshing of linseed and gram in progress. *Tabi* crops prospering; *rabi* crops continue to be reaped. General health fair. Prices steady.

Central India States.—Weather getting warmer. Prices rising. Prospects of opium and other crops fair. *Rabi* prospects fair. Health good. Prices steady.

Rajpootana.—Weather getting warmer. Tanks and wells getting low and drying in many places; rain wanted generally. Opium and other crops damaged by frost in some places, otherwise prospects favourable. Cattle disease prevalent in Merwara. Public health good. Prices show an upward tendency.

Nepal.—The extreme cold is at an end and everything betokens the nearness of spring weather. Prospects fair. Prices high.

Letters to the Editor.

RUSSIAN SAXONSKA WHEAT.

TO THE EDITOR.

DEAR SIR,—I am unable to give you any further information on the subject of the cultivation of the Russian Saxonska Wheat than has already appeared in print. I believe the seed (acclimatized) was again sown in the Ferozepore district by order of Mr. O'Brien B.C.S. Settlement Commissioner, Ferozepore district, and the crop should now be well advanced. The value of this wheat is its richness in gluten. I do not, however, think it will answer and mature east of Meerut, N.-W.P. I have had a long spell of ill-health which accounts for my silence.

DOUNSAL HALL.

February 18, 1887.

THE EUCALYPTUS GLOBULUS.

TO THE EDITOR.

SIR,—Having on serveral occasions been benefitted by your wise counsels and the valuable suggestions of your expert correspondents, I with a number of timber merchants venture again to address ourselves to you with the following queries concerning the cultivation of the *Eucalyptus Globulus*. We hope that either yourself or some of your correspondents will kindly enlighten us on the subject:—

1. How to propagate the *Eucalyptus Globulus*, and at what time of the year?
2. At what places and in what climate does it grow rapidly?
3. How many species of *eucalypti* are there, and how are we to distinguish an *Eucalypti* from other trees?
4. Is the timber of the *Eucalyptus Globulus* equal in quality with teak and other timber?

TIMBER SPECULATOR.

Calcutta, 1st March 1887.

NOTE.—The *E. Globulus* can be propogated by seed and cuttings during the rains. Being a native of Australia it would naturally grow to most advantage in that country; but it has been grown in India since a faily, we believe. Being of a distinct order, it can always be readily recognised by any one having a knowledge of plants, but especially by the aromatic fragrance of its leaves. The timber, we believe, ranks high; but we are unable to say whether it is equal in quality with teak or other timbers. Perhaps some of our correspondents might supply this information. —*Ed., I. A.*

Editorial Notes.

WE had occasion to refer to the implements exhibited by the Burrakar Iron Works at the recent Dumraon Agricultural Exhibition, and we are now informed that Ritter Von Schwarz has received numerous orders for ploughs, water-lifts and cart-wheels: in fact so many that he has been obliged to decline to accept any more for the next three months. This speaks well of the implements turned out at the Burrakar works, and bears out our estimate of them.

THE report on the prospects of the ground-nut crop in the Madras Presidency states that the total area under cultivation from April to November 1886 was 86,591 acres, while the area sown from September to November alone was 53,788 acres, or an average of 62 per cent. The figures for the previous year are not available, except for South Arcot, which had 57,788 acres. This district grows the largest crops of this product, the area under cultivation last year being 61,702 acres; next in importance is Tanjore, with 9,213 acres; then come Chingleput, North Arcot, and Salem.

There are signs of a movement in the direction of bounties in England, for we are informed that on January 16th the Hertford Chamber of Commerce and Agriculture discussed Mr. Poynter's scheme of giving a bounty on home-grown wheat as a remedy for the present distressed state of agriculture. Baron Dimsdale, M.P., who presided, and Mr. Abel Smith, M.P. spoke against the scheme, but the Chamber decided that it was worthy of a thorough and exhaustive consideration, and suggested that it should be fully discussed at the March meeting of the Central Chamber. This is a distinctly new departure from the free-trade principle which economises.

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OUR readers will remember our references to the communications published by our Simla contemporary on the subject of Russian Saxonska wheat from Mr. Dounsal Hall, and the desire expressed by us for further information on the subject. In response to this call, Mr. Hall now very courteously sends us a letter which we publish elsewhere, and hope that Mr. O'Brien will favour us with any additional information he may have at his disposal. It is very important in the present condition of India's wheat trade that she should be able to grow successfully a variety of wheat held in such high estimation on the continent. If, however, as Mr. Hall says, this wheat will not mature east of Meerut, some attempt might, we think be made to extend its cultivation west of Meerut.

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SOME idea of the vastness of the German beet-sugar industry may be formed from the fact that, up to the 7th January 1887 thirty sugar mills had finished their campaign, having converted 13,221,642 centners (a centner is equal to a ton) of beetroot into sugar, as compared with 11,348,206 centners during the corresponding period for 1885-86. Up to the 16th January last 53,666 centners of raw sugar were shipped by way of Danzig, of which 38,666 tons were destined for England, and the remainder for Holland. At Neufahrwasser (Danzig) the stocks of raw sugar at present amount to 669,209 centners, against 786,510 centners at the middle of January 1886. The total Danzig export from the 1st August 1886 to the 16th of January amounts to 1,004,552 centners, against only 430,230 for the previous corresponding period.

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LAST October we published a letter from our correspondent Hem Chundra Dutta regarding an insect-pest which had attacked the *begoon* plant. We sent some of the insects to Mr. Wood-Mason, of the Imperial Museum, for examination and identification, and have now received the following :—

"In reply to your letter dated 29th October 1886, enclosing *begoon* destroying insects, I have to inform you that the large hairy catterpillars have been bred in the Museum (cocoons formed 29th November 1886, *imago* emerged 16th December 1886) and belong to the species *Alope ricini* of Fabricus. These are probably the ones which occasioned the principal damage. It is almost needless to say that the small cocoons from which a species of *pyralidæ* has emerged (genus and species not recognised) is valueless for silk-winding."

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ACCORDING to a local contemporary the disease known as *pebrine* has played such havoc with the silk worms in Bengal this year that the very existence of the silk industry is threatened. An expert who is conversant with Pasteur's methods of treatment is being brought from France to see whether some remedy cannot be devised. In our issue of December 25, 1886 we published an article on the diseases of silk worms, in which was stated that the disease which nearly brought about a total extinction of the silk industry of France was known as *pebrine*, so called in reference to the peppered appearance of the skin of the diseased worms. A reference to the article referred to above will serve to elucidate matters somewhat. But if the disease which has attacked the silk worms in Bengal is really *pebrine*, it is a matter for very serious consideration indeed, and the sooner energetic measures are taken to suppress it the better, or before another year or two the Bengal silk industry will become a thing of the past.

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TOBACCO growing in North Borneo, says a contemporary, promises to be a great success. Till about six years ago the Java tobacco realised the highest price in the market for "coverings." This in its turn was superseded by the Sumatra tobacco, which at present sells as high as 90 cents. per pound at Amsterdam, while Java is only worth about six cents. The Sumatra tobacco has this year been itself completely eclipsed by the Borneo product, which has realised the highest price ever yet paid for covering leaves. The shipment to London was only 300 bales, but the tobacco is said to be of the finest quality, the leaves being more glossy and silky than those of Sumatra, and about 200 of them going to the pound. The report from London has given a great impetus to the growth of tobacco in Borneo, from whence it is estimated that about 30,000 bales will be exported this year. It is curious that so few attempts have been made to improve the growth and curing of tobacco in India. There can be no doubt that, with due care, Indian tobacco might yet hold its own against that of the Dutch Colonies.

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REFERING to the above, a correspondent, who has seen tobacco cultivation in Sumatra, writes as follows on the subject "You wonder that so few attempts have been made to improve the growth and curing of tobacoo in India. Your wonder would soon cease if you were to consider the vast difference between tobacco growing in this country and its cultivation in Sumatra. On one plantation that I was on, we used to clear 1,000 acres of jungle every year and then, when the tobacoo was all in, let those acres relapse into jungle and never again give them another thought. There must be far greater facility for obtaining good jungle land than there is at present, before India can hope to cope (yes, "cope is the word) with Sumatra. Then again, Sumatra (in fact you may say all the east shores of the Bay) has advantages in possessing cheap materials for the huge buildings required on a tobacco estate, that India has not. Further, she has intelligent labour, which India is far from having I can imagine what ruination it would be were tobacco cultivation carried on here as it is in Sumatra. There is not the slightest doubt that it would pay enormously better even than in Sumatra—if the labour could be depended upon and the proper land obtained with reasonable facility.

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"THE tea planters in Assam could take up the cultivation with particular advantage, as their abandoned tobacco land would afterwards come in useful for their tea. It is not the slightest use attempting to compete with Sumatra unless you work on the same huge scale as they do there. From what I saw of tobacco-planting, the curing was the least difficult part of the business. After the trees are once in the drying sheds there is very little more to do than to be very careful. Any intelligent tea-planter could learn all that was needed by staying a few months on a large tobacco estate in Sumatra. The main thing is to do the business as roughly and cheaply as possible, and not to go in for flower-gardening. In Sumatra the tobacco is planted out in the half-cleared field with the remains of huge trees lying about in every direction. The sight of a Sumatra tobacco field would make a tea-planter's hair stand on end. If any tea-planter cares about making a trial of tobacco-planting, I should be glad to let him know what little I remember of it Of course I know nothing of Indian tobacco seasons. With present tea prospects, a planter might do much worse than put down a crop of tobacco in advance of his tea. It would be all clear gain as he would have to clear the land any way, and he might, just as well as not, make a little money in the clearing of it. Then again the returns on tobacco are immediate."

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OUR Chicago exchange announces that the final estimates of the Department of Agriculture on the crop acreage and yield of 1886, has been made public, and gives the following figures on the principal crops grown :—Wheat acreage about 37,000,000 acres, total crop 457,000,000, showing an yield of 12·35 bushels per acre, having an average farm value of 68·7 cents per bushel against 77·1 cents a year ago. The aggregate value of the crop is placed at $ 314,000,000 The total of the corn crop is placed at 1,665,000,000 bushels, on an acreage of 75,000,000 acres, giving an average yield of 22 bushels per acre. The average farm price is placed at 36·6 cents per bushel, against 32·4 cents a year ago, and the total value of the crop is placed

at $610,000,000. The oat crop had an acreage of 23,000,000 acres and produced 624,000,000 bushels, giving an average of 26·0 bushels per acre. The average farm value is placed at 29·8 cents per bushel against 28·5 cents last year. Taking the nine grain producing States of the West, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas and Nebraska, Minnesota led all in wheat production with a crop of 42,866,000 bushels. Illinois led in corn with a crop of 209,818,000 bushels, and also in oats with a crop of 103,649,000 bushels. It would thus appear that with the exception of wheat, all the other farm crops show an improvement in their average farm value.

OUR American cousins are much exercised at present regarding the more extended utilization of flax fibre in paper-making Thus an American exchange writes :—" The same energy, intelligence and skill which has been and is being expended in the production of more perfect wood pulp, would have brought us much nearer to success if it had been directed into the channel we have so persistently urged M Parsy, one of the most distinguished of French chemists, has done much towards the solution of the important question of the retting of flax, in giving to the French a system by which, to summarise it, the flax is retted in about one and a half hours, as against from one to three months by the old processes. This, the retting, has been the great bugbear and drawback to the successful competition of American growers, and is really the cause for the decline in American cultivation of this and other fibre plants With our superior soils and improved agricultural machinery, it is within the power of American growers to compete successfully with the cheap labor of Europe, and possibly India. If, in conjunction with the machines, which have lately made their appearance, for the preparation of the fibre after retting, we can produce these fibres in competition with the cheap labor of the world, what stands in the way of our adoption of these fibres instead of the bulky, costly, and unsatisfactory wood pulp plants we are now striving for "

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IT is generally believed that the mineral products of the United States of America do not hold a very high position in the economy of that country, but from a report lately furnished by the Chief of the division of Mining Statistics and Technology, we gather that the mineral products are valued at $ 4[illegible]5,586,590 This will surprise many of our readers. Coal leads all other mineral products in the aggregate of its value, amounting in all to $1[illegible]9,019,596. Of this amount anthracite furnishes a value of $76,671,948 and other coals $82,347,648 The petroleum product figures up 21,842,041 barrels of 42 gallons each, valued, at $19,193,694. Natural gas used in place of coal was estimated at a value of $4,854,200. Iron ore consumed during the year was as follows : Domestic, 7,600,000, and imported 390,786 tons. The total value of iron and steel in the first stage of manufacture was $95,000,000 The production of the precious metals, as estimated by the mint authorities, are as follows : gold, $31,801,000 ; silver, $51,000,000. Building stone quarried during the year figures at $19,000000 and brick and tile at $35,000,000. Other products are represented by the following figures : lime, $20,000,000, cement of all kinds, $3,492,500 ; millstones, about $100,000 : grindstones, $500 000, phosphates from South Carolina rock, $2,846,064 ; gypsum, $950,000 ; salt $4,930,621 : mica $161,000 ; and mineral water $1,312,845, Some minor mineral products are not included in the above figures, but those presented equal about $7 40 per head of the entire population.

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THE codlin, which is such a dangerous pest in England has found a determined enemy in Professor S. A. Forbes, the State entomologist of Illinois, who reports having made elaborate experiments in the apple orchard with arsenical poisons, the results of which show that an average of at least seventy per cent of the apples now destroyed or injured by the codling moth may be saved to ripening by one or two sprayings with Paris green made in early spring, while the fruit is not larger than a hazel nut. Taking one year with another, the codling moth is found to infest about one-half the apples which set on the trees, and, making all reasonable allowances, it is estimated that the general use of the spraying method must effect a saving to the State in the increased value of the apple crop of at least one and a half millions of dollars annually The cost of the application would be practically nothing, so far as the codling moth injuries are concerned, as the benefit to the trees and the crop resulting from the destruction of curculions, cankerworms and other minor leaf and fruit insects must more than return the small expense of spraying. Observations and analysis have shown that there is not the slightest danger to the consumer of the fruit from poisoning the trees thus early in the season, when the apples are very small and before they have turned downwards on their stems. The experiments show, however that late poisoning is dangerous, and furthermore, is without effect upon the codling moth Paris green was found more effective than London purple or solutions of arsenic, and lime had no effect at all. The experiments on which these statements rest were made under widely varying conditions, during two successive years on several varieties of fruit, the total number of apples examined being nearly 40,000.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 23rd February 1887.—The week under report has been rainless. No report has been received from Burmah The *rabi* harvest which continues in Bombay and Bengal has now extended to the Central Provinces, Behar and Hyderabad. The crops being gathered are wheat, gram, pulses and oil-seeds In other parts of the country the standing crops still promise well, though injury from frost and blight is reported from places in Bombay, the north-western Provinces and Oudh, the Central Provinces, Rajpootana and Central India, and rust has also appeared In the Punjab the prospects of the *rabi* are up to the average, but rain is much needed throughout the province. In Madras rain is generally needed for the standing crops, otherwise prospects are favourable. In Mysore and Coorg the outlook is satisfactory The spring rice is under transplantation in Bengal, and the land is being ploughed for the early rice there as well as in Assam. Poppy is in flower in Bengal, where the collection of opium has commenced in places, and in the North Western Provinces and Oudh is in excellent condition In Rajpootana and Central India the prospects of the crop are fair, though in some places it has been injured by frost, Indigo sowings have begun in Bengal. The public health continues satisfactory in all Provinces. Prices are rising in the North-Western Provinces and Oudh, the Punjab, and Central Provinces and in some States in the Rajpootana Agency, and are falling in Coorg Elsewhere they are generally steady,

A CORRESPONDENT of the *Pioneer* sends to that paper a very sensible letter on the relations of canals, to wheat cultivation. He says :—

The paying crop, in Upper India, is allowed to be the spring crop, and to its extended cultivation will be due the bettering of the agriculturist. I will not allude to measures which the peasant cannot afford, but take simply the question of water-supply. Viewed in the light of real gain and progress, all projects of *inundation* canals are but a step in the right direction. True, they often run early enough for cotton and late enough for one watering for the land to be laid down in wheat, but their main use is for what is known as the rain crop, *viz*, the millets and Indian corn. They do not, in most instances, give the ten months' water needful for sugarcane, which, however, on the light soils of Upper India requires such heavy manuring that this in itself is a hindrance to its extended cultivation. In what light, then, are we to regard the scheme of a *large* canal on the inundation system ? Its water-supply depends on the rise and fall of the river ; its head is liable to be choked with sand ; and yet, if it is to be kept properly in curb and the land it waters be guarded against floods, the sluice gates and dams at the end of the conducting channel from the river must be as expensive as those in any of the perennial canals. The particular canal to which my attention has been of late turned is that termed the Chenab Inundation Canal which is a cross breed between a perennial canal with a weir across the river, and those purely inundation streams which, after carelessly meandering among the old side channels of the lowlands, return their surplus waters to the river lower down

The Chenab Canal is, however, in all respects, save the name and the *utility*, laid out with the same care and expense which were bestowed on the Ravee and Ganges schemes All it wants is a proper head, and to deny it this, is to rob an expensive work of two-thirds of its usefulness and profits That a proper head could be constructed I have little or no doubt, were the funds forthcoming; that the canal will pay without it, is more than doubtful. Let, then, the advice of experienced engineers be called for: and if this is favourable, away with the affectation of pauperism that cannot afford to raise a few lakhs for a purpose that will turn the silt of one of the noblest Punjab rivers into veritable sands of gold.

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An exchange informs that a well kown firm of oil cake manufacturers in Chicago who have always shown a great interest in the science of feeding farm animals, recognizing the drawbacks that now characterize ord-inary oilcake as a supplemental food, have established the manufacture of a strictly supplemental cattlecake known as their Royal Stock Food, and consisting exclusively of nutriment actually supplemental to, and to assimilate with, the ordinary feed produced on the farm. The valuable properties of oil-meal—oil and albumen—are present in this cattle-cake in larger quantity and in more digestable form than in ordinary oil-meal with flesh, fat and milk producing elements of the highest value to the feeder. In conjunction with this Royal Stock Food, a calf rearing meal is prepared as a milk substitute in rearing calves and young stock. It is described as extremely nutritious, digestable and wholesome, and is found efficacious in preventing scouring. A large mass of correspondence and testimonials concerning this cattle-cake and calf-meal have been sent to our contemporary, in which all the above assertions are emphasised by persons of national standing in agriculture and farming.

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In connection with the subject of giving warm drinking water to milch cows to increase the flow of milk, a journal published at the Kansas State Agricultural College, says:—"For some time the college herd of cattle has received for drinking purposes water quite perceptibly warm. We are confident that if those who question the value of this kind of drink could see our cows fill themselves with the steaming fluid they would quickly experience a "change of heart" Upon this the *Farmer's Review* remarks. "Can't they manage in some way to determine accurately if a less amount of food will answer for store cattle supplied with warm water, and if so just how great a saving of food. We already have some facts reported from last winter of an increased flow of milk from cows supplied with warm drinking water, though reports varied greatly in the actual per cent of gain reported. This winter's experience, when many dairymen and feeders are supplying warm water to their stock ought to shed a good deal of light on the subject."

The *Times of India* notices a letter addressed by Mr. J. B. Daveney, late of the 6th Royal Dragoons, to a New Zealand paper, on the advantages of New Zealand as a field for breeding and rearing horses for the Indian army. Some authorities, it appears, have expressed the opinion that there is a marked decline in the Australian horses, known under the name of "Walers," which are largely imported into Hindostan, but Mr. Daveney warmly protests against the horses bred in New Zealand being lossed with these. He points out the remarkable success that has attended the New Zealand Stud Company, which has now been in existence for some eight years. This success is due to the careful selection of the choicest sires and brood mares and to the remarkable suitability of the climate and pasturage for rearing the stock, the result being a supply of horses inferior to none in bone, sinew, and muscle, and which have proved themselves on the race-course and elsewhere thoroughly capable of holding their own in the very best of company. The proposal has accordingly been mooted that a contract should be entered into with the Indian Government for the supply by this New Zealand Company of 500 to 2,000 horses per annum according to requirements. The average price of each horse is set at £40 for Artillery and English Cavalry and £35 for light Cavalry At these prices the animals would be delivered at Auckland, there to undergo all tests before being passed as sound and fit for the requirements of the service. Additional capital would be required to purchase stallions and brood mares—these to be submitted for the approval of an officer appointed by the Indian Government—and to tide over the first four years until the produce of the stud would be available for sale. The amount required is set down at £60,000 and might be raised partly by Government loan bearing 4 per cent interest on the security of the live-stock up to say 60 per cent, and partly by public subscriptions, which would doubtless readily flow in were confidence inspired by the fixing of the contract with the Indian Government for some such lengthy period as twenty years. Certainly the scheme looks both feasible and likely to prove commercially successful. The supply would be permanent, the cost very much less than that now being paid and practical men could readily decide whether the New Zealand bred animals have all the superior excellencies over the Australian "Walers" claimed for them by Mr. Daveney. The authorities at home recently sent out three experienced officers to report on Canada as a reservoir for the supply of military horses for the home Cavalry, and the result of their enquiries is strongly in favour of establishing and extending the permanent depôt in the dominion by contracts of a similar nature to that outlined above. Certainly on the face of the facts there seems no reason why New Zealand should not become a similar feeder for the Indian Army.

TRAVELLING SHOW OF AGRICULTURAL IMPLEMENTS.

Pressure on our space has hitherto prevented us from noticing the interesting report submitted by Mr. C. Benson, Assistant Director of Agriculture, Madras, on the travelling show of agricultural implements organised and carried out by him last year. The first venture of the kind was made in the autumn of 1885, and the results were such as to warrant a repetition of it. The show consisted of demonstrations in the working of improved agricultural implements—chiefly ploughs—varied by occasional lectures, and travelled in the districts of south Arcot, Tanjore, Trichinopoly, Madura and Tinnevelly, for two months, July and August. It visited some twenty of the more important towns of those districts, where the working of improved ploughs, seed-drills, harrows, rice-huskers, and other appliances was exhibited with considerable success, resulting in the sale of some 300 improved ploughs by Messrs. Massey and Co., who deputed an agent to accompany the show. Mr. Benson describes in detail the work done at each place. At Srivillipatur, Mr. Benson says in a piece of hard dry garden land, the ploughs did very good work, as compared with the country ploughs working alongside. The success of the improved implements was equally marked in 'wet' lands. It is noticeable that while the ploughs were understood and appreciated by the people, the harrows and seed drills were found to be "too far advanced for the comprehension of the average ryot as yet." Towards the end of the progress of the show, the exhibition of ploughs resolved itself into the working of the following eliminating what appeared to be inferior patterns:—Massey's "Indian Ryot," E. P. Ransome's "W.M.S." with a fixed pole, and Avery's "Hindustan." It strikes us as curious that "on several occasions it was necessary to send away the bullocks provided, as they were *too large*." This does not often happen to be the case in Bengal. The following remarks by Mr. Benson are worth quoting:—

The travelling show has I think, been a success. Mr Massey tells me he has sold some 300 ploughs in connection with it. We were able only to skim the five districts visited, and in them there is much new ground to be broken, and in many other districts the field is untouched The idea of such shows seems to me to be thoroughly sound, and if carried through, the action is likely to produce most valuable results But it is essential that it should be maintained persistently and steadily, if real and far-reaching results are to be expected If we scatter sufficient seed, we may expect private enterprise to take the matter up and distribute the seed all over the country. Enough has not yet been done. The real difficulty of arranging for making such shows permanent is in obtaining a suitable person to put in charge. A man is required, who not only thoroughly understands the articles he is in charge

of, and who is capable of showing them well and explaining their advantages to the ryots, but also who thoroughly understands the way in which the ryot looks on such articles and how he should be approached in order to recommend the novelties to him. He should also be active and energetic.

We note that the Director recommends that these tours should be continued, and the Board support him; he proposes the permanent deputation of a trained student to take charge of them, and the employment of a competent blacksmith, the time of both to be given wholly to the work. The former proposal has the Board's support, the latter has not; it is not considered desirable that the people should be taught to be dependent on an itinerant Government blacksmith to the discouragement of the local smith, nor, in any case, is it considered fair to the latter that the former's work and material should be given gratis. We entirely agree with the opinion expressed by the Government that it must be brought home to the people that it is to their profit to buy spare shares, which should be readily available and, if it cannot be shown that it is to their profit to do so, then the ploughs stand condemned and the fact should be honestly admitted; if the ploughs cannot commend themselves to the public on their own intrinsic merits, without the assistance of gratuitous repairs by Government, then any temporary advance that they may make must be looked on as a mere paper advance, and not as a permanent fact. The Director suggests also that the exhibitions should be limited to the working of ploughs, but this does not appear to the Board to be necessary; the plough should certainly be the main object of the Exhibition, but it will not be possible to be ploughing always, and the spare hours, it is thought, may usefully be spent in the exhibition of other appliances, to the existence of which, if not to their use, the native mind will gradually become accustomed.

In this connection it may not be out of place to suggest that the Madras Government might take a hint from Bengal, and start an iron workshop on the lines of that at Barrakur, and turn out cheap ploughs suitable to the requirements of the people. The Barrakur ploughs have commended themselves to the ryots of Bengal and Behar, and there is no reason why they should not do so in Madras. At any rate, an experiment might, we think, be tried with a few of the Barrakur ploughs.

DEHORNING OF CATTLE.

We wish to bring to the notice of the authorities and the Society for the Prevention of Cruelty to Animals, and especially to the owners of cattle, the great advantages of depriving these animals of their dangerous weapons of offence and defence. We have before referred to the subject, but it is at present occupying much attention both in England and America. The idea originated with a Mr. H. H. Haaff, a large stock breeder of Illinois, and was vehemently opposed at the time by the Humane and other kindred Societies; but the *Farmers Review* of Chicago espoused the cause, and strongly advocated dehorning as a means of rendering cattle more easy to handle, and for other very good reasons, as will be seen hereafter. In the last number of the *Review* to hand we find the following remarks on the subject.—

Mr. John Boyd, the Jersey breeder, in a communication to *Hoard's Dairyman*, takes issue with Prof. Henry on the subject of dehorning, especially of dehorning Jersey bulls, which he objects to, not on the grounds of cruelty, but because he believes it will destroy the usefulness of the animal. His theory, which he admits is as yet unsupported by facts, is that by depriving the animal of his means of offence and defence, and breaking down his courage so that, as admitted by Prof. Henry his dehorned six yr.-old bull was after a short tussle mastered by a two-year old yet bearing his horns, there is danger that his prepotency will be destroyed, so that he will no longer impress this characteristic upon his offspring and thus a dehorned bull of a noted butter line of decent will become no more valuable as a getter of butter cows than an ordinary bull of the same breed. Further on in the article he declares as another ground of objection to dehorning, that the "hornless cattle are probably the worst fighters in the world, and actually do more damage to one another then those furnished with the weapons nature gives them." This declaration is certainly open to question But admitting its correctness, it actually follows that the dehorned bull instead of remaining a broken spirited animal, speedily becomes a better fighter than ever, so that instead of losing his prepotency, this quality would be increased.

When the Editor had written so far, Mr. Haaf himself walked into the office, and being shown the above, and the letter to which it was a reply, he asked the privilege of adding the following remarks:—

There is nothing in Mr. Boyd's objection I have had the same fear and lived to prove it groundless. Five years ago I dehorned our old Oliver a Short-horn bull. He was as gentle to handle as a lamb thereafter, but he was and continued to be a capital getter. Over three years since I bought "Dauphin" a Hereford bull Dauphin's calves were better and better marked this year than ever, He lacked nothing of prepotency. There is nothing in the objection. I dehorned for my neighbour a three-old-bull and he served a cow within one minute after the operation. Up at Garden Plain I dehorned an imported Short-horn bull and the owner in less than an hour went to the bull with an ear of corn, caught him by the nose and led him out and served a cow and turned him loose a thing never before done with that bull. At Jacksonville, Ill, Dr. Corriel wrote me: "We are now (two months after dehorning) using our bull every day We are all converts to your doctrine. Our Holstein was like a bully with a pistol in his hand; now he is like a bully with "a pistol in the other feller's hand." Sam Taber, of Spring Hill, Ill., tells the same story. So, too, Mr. Pulsifer, of this city; and all had Holsteins. At this point I read with much interest Prof. Henry's letter on dehorning "them steers," which Bro. Gibbs kindly called my attention to, and now I want to say something more. I am going to meet the good professor at Madison, and also the board of agriculture of Wisconsin, and, I hope, "lots" of farmers and cattlemen, and I am vain to believe that when I am done you won't call it "sawing off horns" any more, but will call it dehorning, for you can cut so that the cavity will never fill, and you can cut so that a stub horn will grow, and you dehorn your animal and he not only will not be red, but the cavity will fill and no stub follow. That's the difference between "sawing off horns" and "dehorning" and that is my trick, my discovery, and is what no one ever did discover, so far as we know and this explains why I am so persistent and determined that all the farmers shall have my little book through their own papers and also why I am more than fair in trying to provide a saw that will not break, and a gouge for calves at a small price. Somebody had to do this and who, pray, better than I? A thousand farmers in the north-west have dehorned their cattle this very fall.

Turning now to the United Kingdom, we find Mr. Boyd Kinnear, of Kinloch House, Fife, writing as follows on the subject: —

The practice of cutting off the horns of cattle is one which is revolting to the instincts of humanity, and the high authority of Professor Walley, who, at the recent meeting of the Society for Prevention of Cruelty to Animals, affirmed that it was both needless and cruel, will appear to ordinary persons to be decisive. There are, however, some practical considerations which I should like to put forward. I may say that no one is more hostile to cruelty than I am During many years I was an active member of a society for its prevention, and I have journeyed many a mile and spent many a day in investigating cases which came to my ears. I was at one time entirely of Professor Walley's opinion on the subject of dishorning cattle, I have seen grounds for changing it, and I am desirous to state what they are. Some cattle are malicious, but many, in fact nearly all, are playful. In jest as in earnest, their instinct is to use their horns, just as a dog in playing will pretend to bite. But horns are a serious weapon, even in play. In their natural state, roaming over wide plains, the malicious can be avoided by their neighbours, and the playful can chase each other without coming in dangerous contact. But in our enclosed fields, still more in our confined courts or boxes, there is no escape for the weaker or less agile. Thus injuries from the dig of a horn are frequent. Often the horns are broken off by the middle by getting entangled in an encounter, and in many more cases than the public is aware of the outer horn has been thus entirely detached by the root from the skin, and from the inner core of bone. Even when cattle are tied up long horns will reach a neighbour, and they are further a source of danger to the attendants who feed them, and who, if not very careful, are liable to get a very nasty and even dangerous blow from a toss of the head. In courts

there is generally one beast which is weaker than the rest, and which is kept in such terror that it fails to get its proper share of food. Mr. Scot Skirving, who admits that ripping of the skin is frequent, says that could be prevented by affixing large wooden balls to the tips of the horns. But, though this would prevent ripping, it would not prevent a violent blow, dangerous bruises, or the breaking of the horns by fighting. That these dangers to man and beast are really very general and serious is shown by the simple fact that an ox which has been dishorned will always bring £1 or £2 more in a market than one which has not This is the money estimate by practical men of the injury (and pain) which its horns are likely on an average to cause. If wooden balls, which would cost perhaps 6*d*. would suffice to avert it, the difference in price would not exist Dishorning, whether by cutting the horns off or by eradicating them with a pen-knife from the head when a calf, obviates these risks. The question in point of cruelty therefore is, whether the momentary pain of the operation is greater or less than the probable pain through accidents. Since I have kept cattle, now some fifteen years, and lately to the number of from one to two hundred head, I have come slowly but clearly to the opinion that dishorning is the more merciful system. The pain is not so severe as may be imagined I have seen cows with a horn snapped right across in a fight, or with the outer shell wrenched from the bone, through getting locked in the horns of a neighbour, calmly recommence grazing, with the blood running down their faces. The same thing happens when the operation is performed by man. If rightly done, not one case in 500 shows the slightest bad consequences, or causes the animal to stop feeding, far less to fall off in condition. As far as can be judged by the actions of the animal, it causes no more pain than the cutting off of lambs' tails, which is performed on every one that is born, and infinitely less than another operation which is performed on half the young animals of the horse, cattle, and sheep tribes. The conditions of domesticity compel us to inflict a little pain in order to obviate much more

Look as we will, there is nothing but advantage to be gained from the process of dehorning.

GARDENING IN CALCUTTA.
VIII.

THE PROPAGATION OF PLANTS—GRAFTING—(*Continued.*)

STEM REPLACING GRAFT.

THIS is a modification of the old system of inarching commonly practised in this country; it is very useful in cases where the stem of any valuable plant has been seriously injured, or incapacitated in any way, so as to render a substitute necessary. The operation must be carefully performed, and great care should be taken to see that the union is perfect, before separating the plant from the original stem.

BARK REPAIRING GRAFT.

I have never heard of this operation being performed in this country. In districts that are much infested with hares, it frequently happens that the bark of young fruit trees is entirely nibbled off by them, just above the ground line, in most instances causing the death of the trees.

GRAFTING CUTTINGS.

This is undoubtedly one of the most useful methods of grafting, and is especially useful to the young practitioner, as it requires less skill and care to obtain a successful result, than any other system. The process is simply to unite the two cuttings from their base, an inch or so upwards, by paring them down so as to fit the two together and securing them in a proper position by tying, before the cuttings are inserted. I have adopted this method extensively for the propagation of several of our weak-growing varieties of Crotons such as *Roseopicta*, *Mrs. Barron Chantrière*, and others of the same class. These varieties when propagated as ordinary cuttings, frequently take from one to two months, or even longer, to root properly, but by splicing them on cuttings of *Maxima*, *Grande*, *Aucubæfolium* or any other strong growing kind they not only root quickly, but their after-growth is invariably more vigorous than when on their own roots only.

LAYERING.

There are many varieties of plants, which are extremely difficult to raise from cuttings, but these as a rule may be successfully propagated by layers, and even with many plants that root freely enough from cuttings, it is often more profitable to resort to layering, as by this plan much larger plants may be obtained in a short space of time. The operation itself may be performed in a variety of ways. Some recommend that a small ring of the bark should be removed, to prevent the return of the sap, others are contented merely to pierce the stem in several places with an awl or knife, but the plan most generally adopted, is to cut the stem about half-way through just below a bud or leaf, and splitting the stem upwards for about two inches, which should be kept open with a small wedge or piece of stone. This method does not interrupt the ascent of the sap, and at the same time the cut portion of the stem attracts the return flow, which, interrupted in its progress, exudes at the wounded part, gradually forming a callus which eventually throws out roots. The propagation of ornamental plants and shrubs should be performed either before the ascent of the sap, that is, early in the spring, or after they have fully developed their new growth; or in the case of roses, after their flowering season is over, and fruit trees after the fruit has ripened. In all cases, care must be taken that the layers are kept well supplied with water. To insure this in dry weather, many adopt the plan of placing a small flower-pot half-filled with soil over the layered part. The pot should be filled with water daily; this, gradually percolating through the soil, supplies all the moisture that will be required.

LAYERING BY ELEVATION.

This is but a modification of the preceding; the only difference is that instead of bringing the branches down to the soil, we carry the soil up to the branches, or speaking metaphorically, "as the mountain will not come to Mahomet, Mahomet must go to the mountain" The best way to perform this operation is to take an ordinary flower-pot about four or six inches in diameter, and cut it exactly in halves; place this round the branch that is to be removed, having first taken off a ring of about an inch of the bark. After fixing the sections of the pot firmly in position, fill in with good rich soil, and care must be taken that this is always kept in a properly moistened state. This, as will be seen, closely resembles the old native method of propagation by *gootee*, regarding which Ferminger in his *Manual of Gardening* gives the following instructions: "Select a firm healthy branch, the wood of which is well ripened, and immediately under a leaf bud take off a small ring of bark about one inch wide, scrape the woody part well, so that no trace of bark remains Apply a ball of well-tempered clay: bind it on securely with tow or other soft bandage, make it fast to a stake if necessary, hang a small pot having a small hole in the bottom just over the *gootee* and supply it with water daily. In a few months you will obtain a well rooted plant. As the fibres are emitted from the buds that are above the wound, they will descend into the ball of earth and form roots. As soon as they are seen protruding themselves through the bandage the branch may be cut off from the parent tree and planted where it is intended that it should remain. This appears to be the most expeditious method of procuring strong well-rooted plants, and at the same time is a sure method of procuring duplicates of any desirable variety. Unless, however, some precaution be taken, the water in the pot above will flow out too fast, and very often not fall upon the *gootee* at all. To obviate this, therefore, the following contrivance is commonly resorted to:—A piece of rope has a knot tied at one end of it, the other end is passed within the pot and drawn through the hole at the bottom, till the knot is brought down to fall upon and close up the hole. The rope thus secured by its knotted end within the pot, is carried on at full stretch and coiled round the *gootee*. By this means the water when poured into the pot oozes slowly out, trickles down the rope and along the coil and so distributes itself over the whole *gootee*" Many of our native gardeners are wonderfully expert at this method of propagation. Most of them, however, instead of using a compost of tempered clay employ a compost prepared as follows:—One part *pootee* fish, one part mustard cake or *khullee*, two parts old cow-dung This is placed in an earthen vessel and the whole thoroughly saturated with water, it is then allowed to stand for three weeks or a month by which time it is thoroughly decomposed, and is then mixed with double its weight of strong tenacious clay when it is ready for use. The natives believe that the fish mentioned possesses some peculiar virtues of its own, but probably any other kind in a decomposed state would answer equally well.

APPROACH OR GRAFTING INARCHING.

This is undoubtedly the most ancient of all systems of grafting, and is the means more generally employed in Bengal for the propagation of the rose, than any other. All that is necessary to perform the operation successfully, is to select stock and scion which are not only of about the same diameter, but also in the same stage of growth. The most convenient part of each should then be selected and about one-third of the diameter of each should be cut away carefully with a sharp knife, for a length of about three inches

The two should then be tied carefully together, taking care, as in grafting, that the under sides of the bark meet exactly. The union is greatly facilitated if the junction is covered with grafting wax. As soon as the graft has become established, it may be severed from the parent, at which time the stock should be headed down on a level with the union so that all its sap may go to feed the young plant established thereon.

DIVISION.

This mode is adopted with a great number of plants, such as the Chrysanthemum, Cenerarie, and many other species; all that is necessary to do is to shake all the soil from the roots, and divide it up, so that each portion may have a portion of the roots adhering to it, and re-pot in fresh soil shading carefully for a few days. After becoming established they will be found to grow with much greater vigour than plants that had been left undisturbed.

RUS IN URBE.

NOTES ON THE BEHEEA SUGAR-CANE MILL.

[BY BURROWS, THOMSON, AND MYLNE.]

(*Concluded from last week.*)

[Extract from High Court Decree in Suit No. 1 of 1884].

In the High Court of Judicature at Fort William in Bengal—Extraordinary Jurisdiction.

WALTER THOMSON, of Beheea, in the district of Shahabad and and James Mylne, of Beheea, aforesaid, zemindars and indigo planters ... ... *Plaintiffs.*

AND

Hurry Mohun Ghose, and others ... ... *Defendants.*

Suit for an injunction: for an account of the profits derived from certain machines for expressing sugar-canes, for damages, &c. This cause coming on in the first second, third, fourth, seventh, eighth, ninth, sixteenth and seventeenth days of April last and on this day for final disposal before the Hon'ble Sir Richard Garth, Knight, Chief Justice, and the Hon'ble Arthur Wilson.

It is ordered and decreed that a Writ of a Perpetual Injunction be awarded against the defendants Hurry Mohun Ghose, Mohendro Khan and Panch Cowry Bhadoory (sued as Punchanun Badoory) and each of them, their or each of their agents and servants, and all persons on their behalf during the continuance of the plaintiffs exclusive privileges, under Patent No. 753 of 1874, as amended in the year 1884 in the plaint in this suit mentioned, or any extension thereof, from manufacturing, or selling or disposing of, or using the said Patent as amended as aforesaid or any machine constructed according to the plaintiffs' invention as disclosed in the said Patent or only colorably differing therefrom, or being an infringement of the plaintiffs' said exclusive privileges, and from in any way infringing the plaintiffs' said Patent. And the plaintiffs by their counsel, praying that the damages sustained by them may be assessed on the evidence taken in this suit, It is declared that the plaintiffs are entitled recover the sum of Rupees five thousand two hundred and fifty six. And it is further ordered and decreed that the said defendants Hurry Mohun Ghose, and others, to pay to the plantiffs the said sum of Rupees five thousand two hundred and fifty-six with interest thereon, at the rate of six per cent per annum, from the date thereof until realisation; and do also pay to the plantiffs their costs of this suit with interest thereon until realization.

In the High Court of Calcutta 29th March 1883, on a motion to set aside the Patents granted to Messrs. Thomson and Mylne for Portable Domestic Sugar-cane Mills, specially suited to the wants and means of small cultivators, the decision of Mr. Justice Norris was as follows:—

Upon the whole I am of opinion that this rule must be discharged. I must have seemed to vacillate yesterday and to-day, but it has arisen from a desire to do justice between the parties.

I intimated yesterday that the case was a weak one, and this morning I did the same, and I asked Mr Agnew to state the point on which he contended that the rule ought to be made absolute.

Mr. Agnew's argument was this:—Messrs. Thomson and Mylne could only claim on a combination of old materials or of well-known mechanical appliances, and he invited me to compare the model of the machine commonly used for many years with Thomson and Mylne's machine, and Mr. Agnew suggested, while admitting that Messrs. Thomson and Mylne's machine would perform its work more expeditiously and better, that there was no material difference between the two machines except such as one would expect from the new machine being made by persons more ... [illegible] than the makers of the old machine. If I come to that conclusion, Mr. Agnew contended it was sufficient to justify my making the rule absolute, or calling on the Advocate General to go into his case. I was anxious to look at the cases of Murray *vs.* Clayton, L. R. 7, Ch. App. 570, and Spencer *vs.* Jack [11, "Law Times," New Series, p. 242].

I may say that there is no doubt that one machine is an infinitely preferable article to the other, and the results are far superior from the use of the one to the other, and it is an undoubted fact that there are appliances in the one which are absent in the other. The one is made to be transferred from place to place like the threshing machines, which are now transferred from homestead to homestead in England, while the other is like the old threshing machines to which the corn had to be brought. The habit having grown up here in India of cultivating small portions of land with sugar-cane, a machine made to be taken to the door of the cultivators for the purpose of pressing out the juice of the cane, is one that would be very extensively used.

In Spencer *vs.* Jack, Lord Westbury says:—"It is impossible to deny that, if there be a combination of several things previously well known, which combination is attended with results of such utility and advantage to the public, that the combination itself is rightly denominated a substantial improvement; it is, I say, impossible to deny that that is the subject of a Patent."

I am bound to say, it is impossible to come to any other conclusion than that the combination used by Thomson and Mylne is a substantial improvement. We have the further case of Murray *vs* Clayton, L, R 7, Ch. App. 570, in which occurs an expression of opinion of Lord Justice James. The Vice-Chancellor Bacon had said—" But, assuming all this to be true, I do not think that it can therefore be held that the plaintiff is entitled to the monopoly which the Patents purports to grant. No doubt a combination of things, not in themselves new, but which combination is perfectly new in the form in which the inventor has cast it, and producing new and more beneficial results, may be the the subject of a Patent, but I am aware of no case in which it has been held that the mere arrangement of common elementary mechanical materials, and the construction, by means of such arrangement, of a machine which produces no other result than that which had been previously accomplished by other mechanical arrangements and construction, would support a Patent. If it were so, there would be no protection to the public or to earlier Patents against the ingenuity of any artisan who might have the skill to arrange the old mechanism in a new shape, and thereby to appropriate to himself the fruit of previous inventors' labours in the proper sense of that term, and so that the privilege and reward which the law only concedes to out-and-out wit and invention, might be bestowed upon mere skill in handicraft "

Upon this the Lord Justice observes:—" I find it very difficult to reconcile this proposition with what has been said by many Judges in many cases, and more particularly in the case of Cane *vs.* Price, 1 Webster's Patent Cases, 393 Now, no doubt Crane *versus* Price has been questioned, and if I may be permitted to say so, with all respect to the very powerful tribunal which decided that case, I have never been satisfied with the decision." That, however, was simply because I could not see how the word *combination* could be properly applied to the introduction of a particular kind of fuel into a machine which had been patented for the use of every kind of fuel in the making of iron, and neither I, nor, so far as I am aware, any other judge has ever questioned the principles upon which that case was decided, and which are thus laid down by Chief Justice Tindal:—" We are of opinion, that if the result produced by such a combination is either a new article, or a better article, or a cheaper article to the public than that produced before by the old method, that such combination is an invention or manufacture intended by the Statute, and may well become the subject of a Patent. Such an assumed state of facts falls clearly within the principle exemplified by Abbott, C J, when he is determining what is or what is not the subject of a Patent, namely, it may perhaps extend to a new process, to be carried on by known implements or elements acting upon new substances, and ultimately producing some other known substances, but producing it in a cheaper or more expeditious manner or of a better or more useful kind. And it falls also within the doctrine laid down by Lord Eldon, that there may be a valid Patent for a new combination of materials previously in use for the same purpose, or even for a new method of applying such materials. But the Specification must clearly express that it is in respect of such new combination or application,"

It is admitted by Mr. Agnew that this machine will produce a better article at less price, and, if so, it is a cheaper article.

On these short grounds I am of opinion that no sufficient ground has been made out to make the rule absolute. The rule must be discharged.

The Advocate-General applies for costs on Scale 2, and for costs of photographs and experts. I shall make no special order as to costs.

Competitive trial of Sugar-cane Mills at the International Exhibition, Calcutta, 1st February 1884.

Mill.	Motive power used.	Size of Rollers, Diameter.	Size of Rollers, Length.	Cane crushed.	Juice Extracted. lbs.	Juice Extracted. oz.	Time Occupied. m.	Time Occupied. s.	Work done equal to lbs. juice per hour.	Lbs. juice per 100 lbs. Cane.
Death & Ellwood..	4 Men	7 inches	6 in.	86lb	17	1	4	1	258 lbs,	47·88
Cantwell ..	do.	1 10 ,, 1 5 ,,	8 ,,	do.	22	18	4	37	291 ,,	63 36
Shanks ..	do.	7 ,,	8 ,,	do.	22	6	5	49	230 ,,	62·15
Thomson & Mylne.	do.	7 ,,	8 ,,	do.	23	2	3	18	420 ,,	64·23
Ditto	1 Bullock.	7 ,,	8 ,,	do	23	14	4	7½	347 ,,	66·31

TRIAL.

In the presence of C. E. Barnard, Esq., B. C. S., C. S. I., Chief Commissioner of British Burmah, A. P. MacDonell, Esq., C. S., Secretary to Government of Bengal, and T. W. Holderness, Esq, C S., Assistant Secretary to the Government of India, Revenue and Agriculture Department, at the International Exhibition, Calcutta, 8th February 1884.

Mill.	Motive power used	Size of Rollers. Diameter.	Size of Rollers. Length.	Cane Crushed.	Juice Extracted. lb.	Juice Extracted. oz.	Time Occupied. m.	Time Occupied. s.	Work done equal to lbs. juice per hour.	Lbs. juice per 100lb. Cane.
Thomson & Mylne	1 Bullock.	7 Inches	8 Inches	47lb.	23	2	6	0	331 lb,	70·47

COMPETITIVE TRIALS OF SUGARCANE MILLS.

Made at Habigunge, Sylhet, 17th February 1884, under the supervision of G W. Place, Esq, B C. S., Assistant Commissioner, Cane being a thin white kind, average, ⅞ inch diameter.

	Size of Rollers. Length Inches.	Size of Rollers. Diameter Inches.	Cane crushed per hour lbs.	Juice extracted per hour lbs.	Pounds Juice per 100 lbs. Cane.
Native Mill	39	5¾	379½	203	53·7
Thomson and Mylne ...	8	7	443	282½	57 3
Native Mill	51	8½	547	266	48·8
Thomson and Mylne ...	10	8	555	308	55 8

At the same place the small 8"×7" mill extracted from large red cane (1¼" diameter) 69 lbs. Juice per 100lbs. Cane crushing at the rate of 690 lbs. per hour.

The *Assam Gazette*, 27th June 1884, Appendix A, page 279.—Extract from report of experiment in crushing sugar-cane at Habigunge. By G. W. Place, Esq, C.S., Assistant Commissioner.

The Beheea Mill possesses the great advantage of cleanliness over the native mill. In the latter, the juice falls down on the working parts of the machine, and is received in a vessel placed in a hole below the level of the ground, while the cane having to be passed through three or four times accumulated a good deal of foreign matter in being passed from the side of egress to that of ingress; much of the juice is also wasted, being splashed about the base of the mill.

From experiments 6 and 7 it seems that the Beheea yields 2 per cent of juice more than Cantwell's mill, and takes only half the time. The method of catching the juice in Cantwell's mill is not so effective as the Beheea, where it falls on a tray, placed slantwise underneath the rollers. This Beheea mill is also much simpler in construction and of lighter materials, it weighs only 346 lbs., while Cantwell's weighs 588 lbs., and is very difficult to take asunder

Names of Mill.	Motive power.	Quantity of Sugar-cane.	Time occupied in pressing.	Quantity of Juice pressed. srs	ch.	Quantity of refuse. srs	ch	Density of Juice.	Percentage of Juice extracted.
1. Beheea Mill, double squeeze, three rollers, 8 inches long, two 7 inches, and one 4½ inches in diameter, single lever, 9 feet long	Buffalo, one man driving, and one feeding mill.	25 seers of red cane.	4½ Minutes	17	8	8	0	10	68·75
2. Smaller country mill, double lever, 18 feet 10 inches.	Four driving, two men feeding.	20 seers white cane.	6½ do.	10	11	8	4	7½	53·45
3. Beheea Mill, two rollers, 8 inches high and 7 inches in diameter, single lever, 9 feet.	Four men pulling and one feeding.	Ditto.	5 do.	11	7	8	6	7½	57·18
4. Country Mill, large roller, 4 feet 8 inches long :—Diameter at bottom 7 inches. ,, at top 10 ,, Lever (double) 25 feet.	Six men and two feeding.	2 maund 20 seers Ditto.	72 Minutes 30 seconds.	48	8	49	4	7¾	48·5
5. Large Beheea Mill, two rollers 16 inches long and 8 inches in diameter.	Six men and one feeding.	Ditto. Ditto.	22 Minutes 15 second.	55	8	42	4	7¾	55·5
6. Beheea Mill (as in No. 3)	Four men driving double lever and one feeding.	20 seers Ditto.	9½ Minutes	12	4	7	10	..	61·25
7. Cantwell's mill two rollers, one 8 inches by 10 inches in diameter, one 8 inches by 5 inches in diameter	Ditto	Ditto.	17 do.	11	14	8	2	..	59·25
8. Beheea double squeeze, as No. 1.	Buffalo, one man driving and one feeding mill.	53 seers red cane	15* do.	30	10	15	4	..	65·09

The following is taken from the *Assam Gazette*, dated Saturday 7th June 1884, Part II., Appendix B., page 280-281.

EXPERIMENTS IN CRUSHING SUGAR-CANE AT GOLAGHAT.

Extracts from Assistant Commissioner's Diary, dated 27th March 1884

Three Mills were employed in cane crushing :—

(1.)—A double squeeze iron mills having three rollers (7"×8"); Messrs. Thomson and Mylne's patent ;—

(2.)—A two roll iron mill having rolers (8"×10" Messrs Thomson and Mylne's patent :—

(3.)—An ordinary Assamesehal with cylinders 12"×22"

A buffalo was used to work each mill, and two men were employed in driving each buffalo. 147 lbs. of cane were supplied to each mill.

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(3) —An ordinary Assamese hal with Cylinders 12×22.

A buffalo was used to work each mill, and two men were employed in driving each buffalo. 147 lbs. of cane were supplied to each mill.

In addition to the drivers one man only was employed at working the three roll iron mill, 18 minutes were occupied by it in crushing the cane (once passed through, and the result showed 101 lbs. of juice and 46 lbs. of dry pith.

The same number of men were engaged on the two roll iron mill: the cane was crushed in 24 minutes (once passed through), and the outturn was 98lbs. of juice with 49 lbs. of pith.

Three men were employed on the Assamese mill in addition to the two drivers, i.e., one feeding; one withdrawing cane, and re-supplying it to the feeder, and one removing juice. This mill took 35 minutes to crush the cane (four times passed through), and yielded 82lbs. of juice and 65lbs. of pith.

It may be mentioned that the cane discarded from the wooden mill was passed through the three-roll iron mill and produced 25 lbs. of juice. This juice when boiled, yielded 4lbs. of *goor*.

* nterval of 3 minutes rest.

The result of these experiments may be tabulated as follows :—

Mill.	Motive power.	Size of Rollers: Diameter.	Size of Rollers: Length.	Number of men employed on Mill.	Cane crushed in lbs.	Juice extracted in lbs	Time occupied.	Work done equal to the juice per hour	Lbs. juice per 100 lbs of cane.	*Goor* in lbs.
3 Roll double squeeze Iron Mill.. ..	One buffalo	7"	8"	1	147	101	18"	396·1	68 7	17·25
2 Roll Iron Mill ..	Ditto.	8	10	1	147	98	24	245·0	66·6	17·0
Assamese Mill ..	Ditto.	12	22	3	147	82	35	140 0	55·7	18·75

100lbs. of cane were supplied to each mill, and the following table shows the result.

Mill.	Motive power	Number of men employed on Mill.	Size of Rollers: Diameter.	Size of Rollers: Length.	Cane crushed in lbs.	Juice extracted in lbs	Time occupied in minutes.	Work done equal to lbs, juice per hour.	Lbs. juice per 100 lbs. of cane.	Goor in lbs.
3 Roll double squeeze Iron Mill ..	One buffalo	1	7"	8"	100	60·5	16	226·8	60·5	9 22
2 Roll Iron Mill ..	Ditto	1	8	10	100	57 5	20	172·5	57·5	8.77
Assamese Mill ..	Ditto	3	12	22	100	29·0	19	91 5	29·0	4·0

A further experiment was made between the three-role iron and Assamese Mill.

Two hundred square feet of mog cane were cut and yielded 181 lbs

Ninety-one lbs. were supplied to the three-roller and 90lbs, to the Assamese mill and the result is herewith shown—

Mill.	Motive power.	Number of men employed on Mill.	State of Rollers, Diameter.	State of Rollers, Length.	Cane crushed in lbs.	Juice extracted in lbs	Time occupied in minutes.	Work done equal to lbs. juice per hour.	Lbs. juice per 100 lbs. of cane.	Goor in lbs.
3 roll Iron Mill	One buffalo.	1	7"	8"	91	63½	13½	282·2	69 7	9 0
Assamese Mill.	"	3	12	22	90	48	27½	104 7	53	6·8

The following table shows the average quantity of work done by the three mills :—

Description of Mill.	Size of Roller. Diameter.	Size of Roller. Length.	Motive power.	Number of men employed on Mill.	Average quantity of juice extracted per 100 lbs. of cane (in lbs.	Average time occupied in extracting 100 lbs juice (in minutes)	Average quantity of juice extracted per hour (in lbs.
3 roll double squeeze iron mill ..	7"	8"	One buffalo.	1	66·0	21	284
2 Roll Iron Mill.	8"	10	Ditto	1	62·9	28	212
Assamese ..	12"	22	Ditto	3	47·0	51	118

The result shows that the iron mills required less labour to work them, extracted more juice and occupied less time in crushing the cane."

R. T. GREER,
Assistant Commissioner.

The following figures are extracted from Report of a District Committee held on the 18th, 19th and 20th of October 1883, copies of which were courteously sent to us by Colonel Wace, S. C. commissioner of settlements and agriculture, Punjab.

The zemindars said they could not give in one estimate the expenses of the old country *belna* as contrasted with the new Beheea sugar mill. The reason was that in the Allipore tahsil there was more difficulty in procuring labor, and that this entailed upon them the necessity of employing more men at higher rates of pay than was customary in Sanawan and Muzaffargarh.

They said they had prepared estimates therefore for the Allipore tahsil and for Sanawan-cum-Muzaffargah separately. They pointed out that the new Beheea mill would require more hands in Allipore than in Sanawan and Muzaffargarh.

Monthly cost of working the local mill as compared with that of the Beheea mill.

Alipore Tehsil.

Country mill Called 'Belna'	Beheea mill	Difference in favor of Beheea mill.
Rs. 124 12 1	Rs. 127 4 2	Rs. 67 7 11

The country *belna* employs buffaloes as well as oxen, and they are certainly cheaper, but buffaloes have been proved to be quite able to work the Beheea sugar mill singly.

The zemindars wish it to be understood that this is calculated on a *belna* that shall work for 16 hours not 12 hours, and that shall turn out 100 maunds of *goor* a month. That is to say, that the calculation is on the 100 maunds of *goor* By calculation at the contest it was proved that the 6-inch Beheea mill worked steadily with one ox or buffalo (allowing time for relief, and giving each animal four hours at a steady pace and working for 16 hours), can turn out roughly 100 maunds of *goor* a month and save Rs 67-7-11 on it.

Muzaffurgarh and Sanawan.

Country mill Or *belna*	Beheea mill	Difference in favor of Beheea mill.
Rs 109 2 0	Rs. 70 8 0	Rs. 38 10 0

The zemindars state that they calculate on only working 12 hours a day with their three pairs of oxen and making 75 maunds of *goor* a month. To compare the Muzaffargarh and Alipore accounts we must bring them to the standard of 100 maunds.

This gives the Beheea mill an advantage of about Rs. 51 on every 100 maunds of *goor* in Muzaffurgarh and Sanawan.

The Committee consider that there are several other advantages connected with the Beheea mill besides the saving in oxen and labour.

One lad of 10 years old or a woman can feed the machine. feeding the country *belna* not only requires three men but two of these the *agu* and *dhora*, are skilled men. The *dhora* feeds the *belna* giving the sheaves of cane a twist, and the *dutta valuwanwala* carries them back to the *dhora*. The *dhora* is the man who is responsible for the *belna*, going right, and the people complain that the *dhorus* and *agus* being a limited class of skilled labourers not only give themselves great airs, take high wages, and walk off, if they are remonstrated with about being lazy, but that the country *belna* being entirely made of wood and clumsy in construction, a spiteful *dhora* will, if angered, sometimes contrive to throw the whole machinery off the balance, so that it will break at the first turn.

A *belna* so treated will perhaps be idle for a week or 10 days and another *dhora* has to be hunted up.

Moreover the *dhoras* and *agus* are lazy and wasteful, drinking enormous quantities of cane juice The Beheea mill can only get out of order by ill-treatment. A child can work it, and a zemindar can in one day learn how to take it to pieces and put it together.

The District Committee and other zemindars after examining the *goor* made by the Beheea mill, and that made by the *belna* are of opinion that from three annas to 12 annas a maund more will be obtained for the *goor* of the former. The *goor* is light coloured, granular and fairly brittle. The *belna goor* was red in colour, and as hard as a rock. The *goor* produced by the Beheea mill was 1-32nd more in quantity than that produced by the country *belna*, The Committee have since been informed that we were cheated and, that the quantity of *goor* exceeded the country *goor* by more than 1-32nd. The superiority of *goor* was attributed to the greater cleanliness of the manufacture. The cleanliness of the Beheea mill was very manifest. Another advantage was its safety. The old *belna* has sometimes caused injury to life and limb. The Beheea mill is safe. The Beheea mill can be carried by four men, and can be taken out of the ground and replanted in half an hour. The country *belna* takes several days to plant and several days to remove.

Another advantage is, that if the rollers are purchased at Roorkee, we have skilled mistries who can set up the frames for Rs. 30, including timber. A 6 inch Beheea mill can be turn-out complete here from Rs. 80 ; and on 8-inch for Rs. 90, A country *be na* costs from Rs. 100 to Rs 140.

As the 6 inch roller takes only one buffalo or ox, a poor man who has little capital, and has to borrow need only buy half the animals, and thus pay interest on behalf of the money. The saving is by the zemindars estimated as follows :—

In Muzaffargarh and Sanawan.	Amount.			In Alipore.	Amount.		
On 100 Maunds of *goor*—							
1. Savings in men and oxen	51	0	0		67	7	11
2. Difference in price of *goor* at four annas a maund to take the very least ..	25	0	0		25	0	0
3. Miscellaneous ...	4	0	0		4	0	0
Savings in soap, &c.,	...	...	...		...	...	...
Total Rs. ...	80	0	0		96	7	11

The zemindars consider that 15 maunds a bigah is the average outturn of *goor*. Thus a 6-inch Beheea mill working four oxen or buffaloes for 16 hours a day, and turning out 100 maunds a month, will in four months turn out 400 maunds or the produce of about 26 bigahs. The saving of a Beheea, mill in the season of four months would be about Rs. 360.* The District Committee consider that the new mills will be so beneficial to the country that every effort

* Rs 360, or more than four times the first cost of a Beheea mill with rollers 6 inches long by 7 inches diameter.

should be made to start the Beheea mills to a considerable extent, and that the Committee should, as it is a new thing, treat purchasers with liberality, giving them time to pay when necessary, and in a few cases of poverty, giving the Beheea mill, the zemindar seem very anxious to get Beheea mills, and some more are sure to be wanted.*

(True Copy.)

(Sd) H. C. LINCOLN,
Superintendent.

Miscellaneous Items.

THE annual potato crop of the United States is estimated at nearly two hundred million bushels, of which New York State alone furnishes twenty-five million bushels.

THE quantity of wheat exported from the Central Provinces from the 1st of October last to the 14th of February was 8,48,318 bags of 2½ maunds each, as compared with 12,13,059 bags exported in the corresponding period of last year.

AN important discovery has just been made, which it is believed will give a great impetus to wood pulp makers. Wood pulp is now to be used for the manufacture of all kinds of building ornaments which are generally made in plaster of Paris.

CELLUVERT is a new material formed by passing paper or any fibrous form of cellulose through a bath of nitric acid. The glutinous surfaces so produced are then pressed together and washed, when they form an extremely tough and hard substance, which is well adapted for use in the industrial arts.

IN many parts of Southern Europe a flour is made from chestnuts which is said not only to be cheaper, but fully equal to wheat flour in bread. In some places wheat flour and corn meal are entirely superseded by this product, which is very nourishing, and can be preserved two years longer without injury.

EIGHTEEN hundred years ago, says an American exchange, the Chinese made paper from fibrous matter reduced to a pulp. Now each province makes its own peculiar variety. The celebrated Chinese rice paper that so much resembles woolen and silk fabrics, and on which are painted birds and flowers, is manufactured from compressed pulp, which is cut spirally by a keen knife into thin slices six inches wide and twice as long.

Selections.

AMERICAN COTTON AND PETROLEUM IN GERMANY.

A LOEMING, United States Consul to Bremen, has been in New York, which is his home, on a leave of absence. In conversation with a reporter he was asked if there is any danger of a panic in the American petroleum market as a consequence of the increasing supply of oil in Europe from the Russian fields. "Not the slightest," he replied. "The Bremen tank ships enable American producers to put oil down in Germany as cheap as the Russian article, and the American oil is far superior to the other. It gives a clearer, whiter light, and Germans like it better. As long as it is put in the market at reasonable figures America may be sure of supplying North Germany, and Germany as well, with petroleum.

"There is," he continued, "a project of importance to Americans being perfected in Bremen in the shape of a cotton exchange. It is a combination of the capitalists and the many cotton spinners of the country. Stocks of cotton are to be kept in store at Bremen, the spinners agreeing to buy from that place only. Hitherto the Germans have bought cotton largely from Liverpool, and in consequence of the time between the purchase and the delivery of the commodity the spinners have been compelled to suffer great losses from depreciation in prices. The new plan is intended as a remedy. The syndicate will buy all its cotton from the United States. The Germans like to do business with us. As the prices will be maintained at the same standard as in this country, the advantage to the spinner of Germany is apparent. The arrangement will result in a loss to Liverpool, and, as much of Liverpool cotton comes from India, the change will greatly benefit the United States. German spinners use large quantities of cotton.

"Bremen," he said "is to Germany what Liverpool is to England. America's export trade with that section is continually increasing, and amounts to enormous figues annually."—*Foreign Trade Gazette.*

WILLOW GROWING.

FORMATION AND MANAGEMENT OF OSIER BEDS.

NOT a few persons labour under the very erroneous and misleading notion that in order to cultivate Osiers successfully, all that is required is to push cuttings into a half-prepared morass or swamp or in fact, in any piece of ground that is worthless for another crop. That such notions are as absurd as they are impracticable is well-known to every one who has studied the matter; in fact the three great secrets of successful Osier culture are—first, thorough preparation of the ground, second, planting with only the best kinds of willows, and such as are suitable for the particular soil and exposure—for be it remembered that the soil and situation that are suitable for one class of willows is just as unsuitable for others; and, third, maintaining a thorough clean state of the beds for at least the first three years, after which time the strength of the willows will, in most instances, overcome the undergrowth.

THE GROUND AND ITS PREPARATION.

Where choice of situation is to be had, as will be the case on most estates, that of a low lying, level nature is preferable, more particularly if this be a naturally moist, rich alluvial soil. Again, although it may not be an absolute necessity, ground that can be watered or irrigated at will has special advantages over such as cannot, for during the dry summer months an occasional flooding of the Osier beds is productive of the very best results.

Having decided on the situation, the next all-important matter is the thorough drainage of the ground, for although willows, speaking broadly, are natives of moist—nay, even wet soils, yet to be successfully grown for profit in basket-making it may be well to bear in mind that they survive in dry soil, flourish in that of a moist nature, and, in the majority of cases, die out altogether where stagnant water is allowed to remain at their roots. In soils of a wet, retentive nature it will therefore, be apparent that complete drainage should take precedence of all other operations, and that to a greater or less extent, as will soon be found out after a careful inspection of the ground has been made, for no hard and fast lines can be laid down that would be applicable even in a few cases. Open drains are to be recommended, these being of such a width and depth and placed at such distances apart as will preserve the ground in a dry, sweet state even during the most unfavourable weather. Trenching the ground to the depth of 18 inches or so should next be engaged in, all obnoxious weeds being at the same time carefully picked out, more particularly those of the couch grass and bindweed, or wild convolvulus.

THE BEST WILLOWS FOR BASKET-MAKING

When it is stated, and that after careful computation, that is less than about seventy kinds of willows are cultivated in this country for basket-making, the planter's choice will seem to be extensive; but such is really not the case, for less than a dozen kinds include such as are really valuable and preferable for profitable planting. The most generally cultivated as well as most vigorous growing of basket willow is *Salix viminalis* while other good kinds are *S triandra S. Forbyana S purpurea* and *S stipularis* to which might also be added such small growing kind *S. vitellina* and *S. helix* A score of others might be enumerated, but those given are about the best, and only the best kinds should be grown if it is intended to have the best return for cost of culture and ground-rent. Foreign importations, those from France and Belgium in particular, have considerably lessened the profits of willow growing in this country, and that even within the past few years so that under existing circumstances it will be readily enough seen that not only the best materials but the best system of management must be resorted to, to make willow growing at all remunerative in this country at the present time.

MAKING AND PLANTING THE SETS.

The cuttings, or sets as they are more generally termed, may be of lengths varying from 12 inches to 18 inches, but a medium between these two is that usually employed, for the planter must be guided to a great extent as to size of cuttings, by the nature of the ground he is about to operate on, that of a rough, lumpy texture requiring longer and stronger than where the land is level of surface, as is likely to be the case if a crop of potatoes has been grown on the ground previous to cropping it with willows.

It might likewise be noted in passing, that we have seen this system of ground preparation, by first taking a crop of potatoes or turnips, carried out with good results on several small farms in the north of Ireland. The potato crop, especially if kept free from weeds, leaves the ground in a nice, clean, and level state for receiving the willow sets, and if properly looked to afterwards, and at the right time, ground so treated will cost but a trifle to keep it in good tilth and clean for a number of years. Another advantage of preparatory preparation of willow ground by first of all taking a farm crop from it is this, that a heavy coating of farmyard manure can better be applied, the good results of which will be apparent on the succeeding crop of Osiers for a number of years.

Good Osier sets ready for planting may be procured from any respectable willow grower at about 10*s*. per 1,000; we have known 20*s*. per 1,000 paid, but a better, as well as cheaper, plan is to purchase a ton, or whatever may be deemed sufficient for the ground to be planted, of the willow rods, and have them prepared on the ground. In making the sets—which as before stated should be 12 inches and upwards in length—commence at the butt ends of the rods, and with a sharp knife cut into the lengths required, repeating the process only as long as the wood is hard, or nearly destitute of pith, that towards the point being cast aside as useless for the purpose in view. Next arrange the set according to strength, place the eyes all one way, and tie into bundles. In planting the sets use a common garden line, and place them 16 inches apart and 2 feet from row to row, these being a good uniform rule for the larger growing kinds; while the finer sorts may be planted 10 inches, or even 8 inches apart.

Close planting in the case of basket Osiers is certainly to be commended, as when allowed too much space they grow strong, rank, and bushy; but the quality of soil, as well as particular sort of willow to be planted, can about determine the distance apart which the individual cutting should be placed. February may be considered as about the best month for planting, although in not too cold soils good results have followed the insertion of the cuttings even a couple of months sooner.—A. D. W. in *Gardener's Chronicle.*

RICE IN THE UNITED KINGDOM.

One of the effects of the general fall in prices all over the world has been to compel producers or manufacturers abroad to improve their processes, in order to appeal as far as possible to the consumer, and among many others the British rice millers are affected by this change. Until recently no rice was exported in a cleaned state from the producing countries, but it was all sent away in the husk, and left to European and American millers to clean who thus had the monopoly of the supply of the Continent and the United States. Up to and including the year 1882 the exports of rice from the United Kingdom, as given in the Board of Trade Returns, increased pretty regularly, but during the last four years a steady decrease has taken place, as the following figures will show ;—

	1882.	1883.	1884.	1885.	1886.
	Tons	Tons.	Tons.	Tons	Tons.
Imports ...	413 009	387,386	329,542	278,053	329 456
Exports ...	200,404	189,432	171.395	156,596	151 645
Leaving for home use.	212,605	197 954	158 147	121,457	177,811

The cause of this decrease may be partially found in the fact that our own millers have evidently been behind their continental rivals, and particulary the Dutch, in their manufacture. The latter have practically had the monopoly for years of milling Java rice, and of the supply of the finest qualities to England. With a view of contesting this monopoly. Messrs. Fraser state, in their recently published review of the Rice Trade in 1886, that a few cargoes of Java rice were landed last year in London. Hamburg, and Bremen, to see whether others could not mill as well as the Dutchmen. This is a sign of progress, but the German competition is, it must be noted an entirely new thing. It is apparent however that it is not only their continental rivals who are threatening our rice millers' trade, but that the producing countries are learning to clean their own rice. This is notably the case with Burmah, Japan, and Java, three very important sources of supply for rough rice. Though the Indians are not as yet milling the large quantities grown in Bengal, it can only be question of time ; as they have plenty of coal close to the rice districts, plenty of cheap labour, and they at present have also the advantage of cheap money, through the depreciation in the value of the rupee. It is true that the rice milled in the tropics is not as yet good enough for the fastidious taste of the English consumer, who, though he is generally contented with his rice being served up to him in a glutinous or pulpy mass, yet expects it to be snow-white, though possibly some of the brown coating of the grain is highly nutritious. This foreign milled rice is however, accepted as sufficiently good in several important markets, hitherto supplied by our millers, and, after all it must be a simple matter to perfect the cleaning machinery used abroad. The difference in price, or the cost of milling and the profit upon it between rough and cleaned rice, may be roughly stated in this country at from 1s. to 3s. per cwt. From Messrs. Fraser's Circular, quoted above, it appears that the price of rough rice was never so low as it was during 1886. There is consequently every inducement to the growers to mill their own rice, and thus to save wholly or in part this millers' margin of from 1s. to 3s. per cwt. When it is remembered what our sugar refiners have to do in melting, clarifying, concentrating, filtering and recrystallizing for not more money than that which is enjoyed for the comparatively simple operation of husking the finest rice grain, the margin on milling seems certainly high. It should be remembered too, that so far as the milling is concerned, the finest rice is cleaned, not in England, but in Holland ; and with the new opposition from Germany, but still more from the producing countries facing them, it becomes essential for the English millers, if they are to hold their own against foreign rivals, to make such economies as they may be able, and to improve their manufacture to the utmost. It is satisfactory to hear that one of the leading firms of English millers have already made great improvements in their machinery, &c Hitherto, with the exception of the small supply of fine Java, we have cleaned rice more or less for the world but our supremacy is already threatened, and if our millers cannot meet the new forms of competition our great export trade must go, even if the producers do not supply us direct with cleaned rice. So far as our own country is concerned, the Liverpool millers seem to be gaining ground on the London ones. Why is this ?—*Produce Market's Review.*

THE SILK INDUSTRY.

HOW TO REAR THE SILK-WORM.

The chief points to the noticed, in the rearing of silk-worms, are: —(1) The erection of the rearing house ("magnanerie") ; (2) the hatching of the eggs ; (3) industrial egg-production ("Grainage Industrial ; (4) cellular egg-production ("Grainage Cellulaire") according to Mr. Pasteur's method ; (5) Cellular egg-production by the system "Microscope Sericole photo-electrique Malaze;" and (6) the application to India of the automatic electic system of filature. In all countries where mulberry trees are plentiful the rearing of silk-worms will succeed under the conditions of a good temperature and healthy and sufficient nourishment. There must however, also be provided premises, easily ventilated, pretty lofty and having several openings in the ceiling, if possible, to admit air at will into the interior of the rearing house. The internal fitting must be attended to, as well as the rearing tables. For one once of eggs you should have at least 12 to 15 tables or trays, each two metres long by about 1 more 15 centimetres broad. If the nursery be lofty enough, from four to seven ranges of tables or trays can be placed one above the other with spaces of 40 centimetres between them. The tables are made of four legs with cross pieces of wood of the height of 40 centimetres, On these cross pieces are placed planks side by side to form the surface of the tables.

When the tables are arranged and the windows and doors are in good order, the sanitation of the premises should be looked to. The use of coal tar and chloride of lime is one of the processes greatly employed in Europe. It is only necessary, eight or ten days before bringing in the worms, to sprinkle the walls, planks, tables, and ceilings with lime water, and in order that the disinfectants may attain the desired effect, the windows and doors must be closed immediately after words for about 24 hours. During the rearing it is necessary that the flooring should be sprinkled once a week with chloride water, As regards the coal tar, a vessel with this substance is placed uncovered in the middle of the nursery, and kept there during the whole period of the reading of the silkworms. The emanations from the tar and chloride of lime not only purify the air, but keep away flies, rats mice, &c., which are so destructive to silkworms.

In the storage ("entrepot") of the leaves, one of the most essential points is to prevent damping or heating. They should therefore, be placed in a dark room, cool but not damp, spread out, without piling them up too much, and also moved often to prevent fermentation. If a cellar is employed for storing, it will be necessary to plank it so as to prevent the leaves coming in contact with the ground.

During the first stages of the worms, the leaves of wild mulberry trees are given in preference. They should be gathered, as much as possible, in the morning after sunrise, and when the dew has disappeared. It is of importance that they should be fresh, free from dust, and not distasteful to the silkworms When bad weather is expected, care should be taken to lay in a supply of leaves a little time before, as they should never be given to the worms when they are wet.

The period for the hatching of the eggs varies according to the climate ; flushing of mulberry trees should be a guide. When the new leaves appear, it is essential to prepare a small room which gradually heated up to 18 to 22 degrees Reaumur. If the weather is to cold, an earthen vessel containing ashes and live cold is placed in the room. On this another earthen pot is put containing ordinary water in order to obtain a small evaporation of steam to assist the issue of the worms from their shells. The eggs are completely hatched in eight or ten days from they time they are so placed for the purpose, if they have not already experienced a commencement of incubation during their voyage. They issue from their shells in the morning, and immediately look for nourishment. They should then be covered with tulle having large meshes on which are placed the tips of mulberry leaves. When the leave are covered with worms, they are taken gently and placed at a distance on a sheet of paper, and then distributed on the tables or trays in the rearing house, care being taken to separate the hatchings of each day to equalize them afterwards, as indicated further on.

The number of worms first hatched being small, it would be better to preserve them and hasten their growth by alloting them the warmest place in the rearing house and increasing their meals In this way there will be an advance made which will severe as a guide in the werk of rearing. The transformations which the worms undergo (that is, their moulting) during the course of their existence, are disclosed to the rearer by certain symptoms which it would be well to know, for it is very essential that the worms should run through the different stages altogether It is necessary to stop all the meals the moment the worms fall asleep ; and even if some should awake, there is no harm done in allowing them to fast and await the awakening of the others.

The first moulting ("mue") is ordinarily of five or six days duration, after which the worms have a glossy appearance. Their heads become white and double in size, and their appetite diminishes visibly. The duration of the sleep is from 24 to 36 hour. The worms, in passing through this moulting, take a dark grey shade. Four meals per day are sufficient. The letter should be removed every three days.

The second moulding lasts one day less than the first. The meals should then be four or five per day, and the removal of the litter should be effected every two or three days. The worms fall asleep about the fifth day, They appear flat-nosed with the head contracted and the body a little yellow. The length of the second sleep is about 30 hours, The wormt awaken with the head white, the nose large and chestnut coloured, and the body of a dull white.

The third moulting lasts at the six days. The meals should be five or six a days the letter removed every two days, The nerd of this stage is somewhat transparent, shortened, and contracted, and the nose appears to become smaller, The sleep lasts about 26 hours. On awaking the worms have the nose large and chestnut coloured, and the rest of the body is of a light chocolate.

At the fourth moult, the removal of the litter should be more frequent, every day if possible and the worms placed further apart. The meals from the fourth to the fifth moult should be increased in proportion to the appetite of the worms about six to eight a day. The average length of duration of this moult is from six to seven days, during which the worms become white and transparent. They fall asleep for 40 hours and awaken with the nose large and the body dark bricy coloured.

The fifth moult lasts from nine to ten days, and increased attention should be given from the fourth to the sixth day, as the worms are being purged and turn white. Intermediary meals

should be given in proportion to rheir appetite. The airing and the removal of the litter should be most carefully done every day. When the worms commence to wonder on the edge of the table, trying to climb and make their cocoons, it is the sign of their maturity The body is then of a pale yellow and soft to the touch; the head is quite transparent and of a shady tint. The excrements, hitherto hard and black become soft and greenish. I is tame to place the heaths, or in their absence chips of wood or any sort of twigs.

The littler formed by their exerements and partly eaten leavef ehould be frequently removod. To do this nets, or sheets of paper pierced with holes are placed on the worms. Mulberry leaves are then placed on the nets or papers, which rhe worms rapidly cover. It is then easy to remove them to other tables, giving them more space according to their develop ment, The removal of the litter should be be more frequent during the last stages, as it increases every day from the abudance of tho noursshment. In the absence of paper or nest the removal of the litter must be done as follows. The warms are lifted gently by hand, and placed in small quantities, delicately, on a sheet of cardboard 35 centimatres long bo 25 broad, and then transferred with the cardbroads to othor tables. The litter should be removed with care and ehrown at distance from the nursery, to prevent the dust reaching the worms, The floor of the rearing-house' shauld be watered before being swept.

To enualize the size of the worms and to hasten the growth of those thal are less advanced, an eutra meal a day is given to the latter till thoy have attained the size ehe others, wh oh tqey, bowever, soon dd. If, from the construction of the' premises, one spot is warmer than another, they should be given tho warmer place in apreference. The worms should be placed sufficientlp apart, not be one on the top of anothor They are given mhre space in proportion to their growtl.r The litter should never be removed or the worms touched while they ase asleep

The temperature of the nursery should be from 86 to 18 degrees Reaumur during the day and from 14 to 16 during the night. During the later stages it is increased by four or five degrees The air in the rearing house must be renovated as often as possible by opening the ovtlets which are most suitable accordsng to the temperhture outside. For insance the windows, on the opposite side from which the wind is blowing are opened especially when there is a south wind which is unfavourable In no case is theair, when carefully distributed injurious to the worms. It is even wise during very hot weathor to leave the windows partially open during the nighht, selecting howevor those gurthest from the tables on which the worms remain to prevent the direct contact of air, In the event of a stopm, it is absolutely necessary to close up the autlets communicationg directly with the outside, to renew the air with a wood fire of mulberry, if possiblo, and to shut out carefully all currents of air,

The worms being ready to make thoir cocoons, the heath of clips of wood or twigs are placed on the tables in the ferm of a vaulted gallery, if convenient, 25 to 30 centimes apart from each other. During the climbing, which takes about 40 hours, light meals are distributed to the backward ones, which worms should be removed 24 hours after the others have climbed, and placed on other tables er trays, and so on. This last operation should be porformed with tho greatest care, and without disturbing the worms which are spinning their cocoons.

The silkworms take about three days to make their cocoons, and about six days elapse before they are transformed into chrysalises. To be on the safe side, the cocoons should not be removed till the ninth day after the climbing. But I must return to the subject in another letter

G GAUTHER, *in Englishman.*

LUNG PARASITES OF CATTLE AND SHEEP.

THE recently published *Journal* of the Royal Agricultural Society of England contains a valuable suggestive paper on the 'Lungs Parasites of Cattle and Sheep.' by the late T. Spencer Cobbold, M. D., F R S., who devoted his life to the study of entozea, made many important original investigations in this hitherto unworked department of natural history, gathered much information regarding the treatment and prevention of animal parasites affecting both human and veterinary patients, and for many year lectured on heminthology at the Royal Veterinary College, London The present report presents important original information regarding the strongyli or thread worms, which infest the air passages of herbivora, and which cause the familiar disorder known as husk or hoose. Five of these entozoa have been named as follows :—

1 *Strongylus micrurus*; the small tailed strangyle, better known as the common cattle lung-worm, or husk-producing worm.

2 *Strongylus filaria*; the large-tailed strongyle, better known as the 'filaria,' or common lungworm of sheep and lambs.

3 *Strongylus paradoxus*; the puzz'ing strongyle, better known as the lung-wormof the pig.

4 *Strongylus rufescens*; the rufous or reddish brown strongyle, sometimes called the large lung worm.

5 *Pseudalius pulmonalis*; the filament lungworm, better known in England as Dr. Crisp's gordius worm

The life history of these several species was being investigated by Dr Cobbold at the time of his death, upwards of a year ago and he believed that each species undergoes similar growth, development and changes. Strongyli are surprisingly prolific Cobbold found the body of a female lungworm from a calf crowded with eggs, many of which contained fully developed young in the embryo state; he reckoned that an adult worm contained 100,000 of such embryos; Beulah a practical agriculturist and microscopist, estimates them at 300,000; while Cobbold and other authorities believe that a single female worm during her comparatively short life, produces several million embryos. Fortunately, a small proportion of these find, however, the several conditions requisite to bring them to perfection. The transparent embryo, slightly tapering at the tail, and about one-tenth of an inch in length lies coiled on itself, and enveloped in a delicate membrane, but it has no actual egg shell. Placed in a warm, moist medium the embryo quickly emerges from its envelope. Cobbold at various times, hatched myriads, which came out [illegible] in finely sifted moist earth placed in watch glasses or in topid water. He kept these young worms for various periods, in one instance for five mouths, without, however, their undergoing any material change, excepting the development of a mouth and rudimentary œsophagus, It hence appeared evident that other conditions were requiste to consummate further development.

A happy chance furnished a clue; from an adjacent jar containing ferns a small earth worm had strayed into the tempting moist earth of one of the watch glasses, and apparently found the embryo strongyli natural and satisfactory eating. Cobbold did not wait long for further evidence; he snipt off the tail of the intruding earth worm, and found amongst the intidinal contents numerous strongyli embryo, some of which, although only swallowed a day or two previously showed much further advancement than they had reached during many weeks residence in the moist earth. This lucky find was immediately followed up; the severed earth worm was returned to the watch glass, and severed for repeated subsequent observations; into other colonies of embryo-strongyli earth worms were introduced and Cobbold found that in the body of the intermediary host the embryos not only increased in size but speedily developed a digestive canal and reproductive organs, and assumed the larval state These observations appear to demonstrate that earth worms are the usual intermediary hosts which nurse the strongyle through its larval stage in much the same manner as the black fresh water snails (*Limnæus pereger* and *L. truncatulus*) are the intermidiary hosts of the fluke worm investing the liver of the sheep. Leukart has found that fresh-water crustaceans harbour and carry through their larval state the thorn-headed worm (*Echinorhynchus gigas* and *E. proteus*) which sometimes infests swine, especially in America. The mosquito appears to be the host of the *Filaria sanguinis hominius* which occurs in human patients in warm climates and is described in Cobbold's work on the *Parasites of Man and Animals.*

Prosecuting the life history of the lung-worms, Cobbold took the larvæ from the intestines of the earth worms, and those naturally extruded by them, and placed them on the fronds of ferns under a bell-jar, when, to use his own language, 'under the 1 inch Ross objective glass, I had the satisfaction of detecting one of the larvæ in the act of cruising about very actively. The addition of a drop of water increased its activity, and it became extremely difficult to follow the little creature's eel-like movements In size it had so much increased it was now actually visible to the naked eye, measuring as much as one-thirtieth of an inch from head to tail' The highly-developed larvæ were next placed in the hollow of an excavated slide, moistened with human saliva, and maintained at a temperature of 70 dogs., when they were observed to be particularly lively; but activity and vigour were reduced, and death ensued, when the larvæ were returned to the fronds of the fern and the lower temperature of the bell-jar.

Cobbold, unfortunately, was unable to repeat and extend these experiments, and it is of much practical importance that some competent observer should rear, as he did, a number of strongyli larvæ administer them to calves and lambs, and thus note, as probably would readily be done, the competition of the life history of this parasite Cobbold's investigations he has himself thus summarised:—'It would appear, that the embrylus of the hoose of husk strongyle (*Stangylus micruorus*) require a change of hosts in order to arrive at the larval state. After their passive transference to the bodies of earth worms and subsequent escape into the soil, they undergo inportant changes more or less moisture being in all cases necessary for their growth in the free state, What may be called the penultimate stage of life having thus been arrived at, it becomes more than probable that the final passive introduction of the worms into the lungs of the calf is accomplished during the act of feeding. In short the young worms commonly gain access to their victims either with fresh cut fodder obtained from low-lying pastures, or from the grass of swampy grounds or it may be occasionally from stagnant pound water itself: so that in one or other of these ways the accomplishment of their ultimate destiny is amply secured. The organisation of the strongyloid larvæ is already so considerably advanced during fifty or sixty hours freedom in dew or water, that when once they have been conveyed to the lungs it is evident that only a very few days sojourn within their victims is all that is necessary in order to enable the young worms to arrive at maturity. In other words about a week or even less will be sufficient for them to acquire their definite sexual form size and other adult characteristic.'

BRICK TEA FOR THIBET.

By the Peripatetic Planter.

I have since writing last week, spent an afternoon with one of the best authorities one of the half dozen living Europeans, who can speak with any personal knowledge on Thibetan affairs. His experience has been gained by a residence of not a few years in what is virtually—if judged by the race of the inhabitants—a Thibetan district. He has never heard of the Lhassan Government utilizing the Jangpans (*Tehsildars* they may be called) for the distribution, under Government monopoly, of brick-tea as set forth in the article in your issue of the 28th December last; to which I referred at length in my last letter. I have already shown that the Abbe Desgodins will not allow that there is any monopoly whatever in Thibet The authority above referred to wrote me a letter before our interview on the strength of having, however, read your article which he had forwarded to him for his perusal and comment. In that letter he wrote:—

"Certain traders or tea-contractors (called Lep chok) are given a monopoly of a certain quantity of tea by the authorities at Lassa" (at our interview he wished to explain that he is not certain on this point of monopoly, and his personal experience does not allow him to state it as an absolute fact). "With this tea (however obtained) the trader starts westwards and palms off a brick here and two brick there, on all the people along the road, He does not take payment for it till the return journey at earliest when he collects payment as he goes along, in the shape of sheep, goats butter, &c., or allows debts to run on at interest for years and then comes out again from Lassa and collects it. On arriving at his journey's end, Ladak, he sells what he has reserved for that and the Cashmere markets, in the ordinary way—that is, barters it." Now read in the light of the description of the system of Thibetan trade found in "Le Thibhet" this may be explained as follows. The Thibetan trade is conducted all over Thibet in a pedlar-fashion. The merchant starts from home—wherever that may be—with surplus goods, &c., travels East till he reaches the salt mines at Yukalu below Bathang, supplies himself there with salt, carries this to Ta-tsien Loo in Szechuen exchanges the salt there for brick-tea &c, returns to Thibet, travels from one end of Thibet to the other, distributing and exchanging his brick-tea, silk, &c., as he goes, and gives credit to force business. Returned home he makes another journey round, or a brother goes instead who as no books are kept does not know all the debtors who thus perchance escape for a period only to be dunned eventually, perhaps years after, with full interest when the first brother appears on the scene again. This also accounts for the supposed Lhassan origin of the tea Everything in Western Thibet which comes *through* the holy city of course is said to come *from* Lhassa.

Having now, completed the comments I have to make on the article in your issue of the 28th December and as the rest of my friend's interesting letter opens up a new turn of two in this discussion, I will hold the rest over to next week to allow of a clear start, without reference to the debate already raised. Can you meantime, for the inspection of your readers passing through Calcutta, obtain from Rangoon some sample balls of the "ball tea" received in Rangoon from Western Yunnan for export to Bombay *en route* for Yarkand, Kashuar, &c? Even the name of this tea may be new to many of your readers. It is poor rubbish but in these days we should know the likes and dislikes of every possible customer, and know how to meet those; by such true commercial policy our continental rivals are passing us in all new markets. I do not mean to give any importance to this "ball tea" but it has an interest, and although the trade done now is limited, the high price may account for this limitation, and if we can lay down balls at a fourth of the present price it is possible the demand might increase twenty times, or more

—*India Planters Gazette.*

WOOD PULP.

Assuming, for the time being, that acidulated-basic water is absolutely necessary to thoroughly disintegrate any and all woody fibre, this process takes it for granted that the same must be exposed to its action for a certain time to render the process complete—there being some difference of opinion among practical chemists regarding the necessity of keeping the chips under pressure, some arguing a weak solution a long time, while others, with equal propriety, figure the best results with a stronger solution and less time. Be this as it may, and the results in favour of which ever side, the aggregate cost per ton of the manufactured fibre cannot materially differ, inasmuch as the crude magnesite at twenty dollars per ton, sulphur at twenty-two dollars, does not cut a very great figure in making a solution containing but a mere fraction of these elements whereas, coal, at say three cents per bushel, fed to furnaces to develop heat sufficient to furnish this pressure of eighty or more pounds to the square inch, must, of necessity, tend to augment the price somewhat, when twenty hours, instead of eight, is considered the time necessary to disintegrate the fibre.

The question, however, at this time is, why acidulate the solution of magnesia at all? Again, why bring into requisition the one, simply using the pressure of steam alone? It is not idle theory to argue thus. Take the calculations and hypotheses of the best American and European chemists; some say shorter time, greater pressure; others say shorten and weaken all, and increase the time. Hence upon the assumption that any of them are correct, the entire process must be susceptible or large curtailment, inasmuch as an old philosophical truism is that any thing that can be approached to completion, can, if carried sufficiently far, be completed On the strength of this philosophical principle, if one chemist can reach better results by weakening his solution and increasing the pressure and amount of time, he can, and will eventually, dispense with solutions altogether bringing about results in proportion as he has now achieved success by this increase and diminution of one and the other. And upon precisely the same hypothesis those who have reached the best results by shortening the time and increasing the strength of the solution, must reach proportionate results by dispensing with pressure altogether

We are well aware of the fact that we lay ourself liable to harsh treatment from the champions of each and all deviations from the rule as lain down in the patented specifications of the inventor of each and all these processes, nevertheless, we have merely stopped at a medium between them all, with theoretical results as mentioned in the foregoing, the deductions of which, when practically demonstrated by laboratory practice, we well now discuss in-so-far as the tests of various processes have been made.

Taking some of the woods listed in a previous article as among those used in paper manufacture, both in this country and Europe, we find them all susceptible to certain variations of the same treatment, with results little, if any, different, excepting, perhaps, in the matter of colour; this, however, is considered of minor importance in this connection, inasmuch as the process of bleaching is perfected to such an extent that given a good, long, tough, and thoroughly disintegrated fibre, the question of colour is only a matter of a few simple, inexpensive tests.

For these experiments no discrimination in favour of special woods were made, but the wood, together with its manufactured fibre, were taken from mills of this country having adopted this bisulphite process, and the fibre made by means of crude laboratory processes, was equal in every respect to any obtained from the mills, and superior, when obtained from certain woods, when measured with the micrometer. And it must be borne in mind that the entire process, as lain down in the directions of the inventor, were distorted to that extent as to be unrecognisable proving conclusively that from the standpoint of certain resources in favour of different *modus operandi* of this process under discussion, were like the philosophers of old!—

Matured thought will prove ere long,
That all were right, yet all were wrong!

That an acid solution is not needed to disintegrate, is proven by the fact that wood subjected to merely the boiling temperature of water, will disintegrate to that extent that mechanical pressure alone will thoroughly separate the fibre, leaving the same in a soft spongy condition, and when spread out and pressed, even cold cannot be distinguished with the unaided eye from the best unbleached wood pulp obtainable from any of the mills That the fibre has not deteriorated in any respect, must be plain to the most firm adherent to the theories of any of these scientists mentioned, from the simple fact that the wood has been subjected to no chemical influence having a tendency to change in its constituence one iota and if subjected to it for days, weeks, aye, months, with extraneous substances carefully guarded, not a single molecule would be displaced. Then with the mechanical appliances, no nice and careful manipulations are necessary; in short, this part of the process merely takes the place of that termed the blowing off against a solid substance, where the power is conducted as directed.

Again, to favour the opposite theory of no, or rather decreased pressure, the same variety of wood subjected to the permeating influences of searching acids, having the power of dissolving or assimilating the resinous or other adhesive or combining properties of the wood, is found to leave each individual fibre separate and distinct in fine condition for viewing the physical structure of every variety of wood beneath the microscope, and that, too, without any heat or pressure. In this case the fibre seems to have retained all essential characteristics, save that with certain varieties of wood, the matters dividing the fibre during the growth and development of the tree seems to have become charred by the action of the acid; this, however, does not seem to effect the parts desired to use in subsequent manufactures.

Before it is possible to continue in favour of any theory heretofore advanced concerning the various plans to be adopted advantageously, we must revert back to some of the preliminary steps to be taken, when concluded, in what may be termed, regular order

In packing the raw magnesite ore, the process demands one foot of the raw ore be packed in the bottom of the tower. Fire from either wood or coal is now allowed to come in contact with the mass until the whole is thoroughly calcined, and the same results are apparently obtained with either coal or wood used for fuel. By any system of chemical reasoning, it is plain that there must be some reason why the baser extraneous elements from the coal —such as sulphur, acids, etc., volatilised during combustion, but must be taken up by the calcining one, and when the sulphurous gases from the sulphur or pyrites furnace are allowed to permeate upward and through the mass, there to come in contact with the hydrogen, returning back, washing off the soluble portions of the ore, it must become, to a certain extent, impregnated with these extraneous matters, effecting to a degree proportionate to the purity of the carbon, and perfectness, or rather, completeness of its combustion. Nevertheless, with all the mills now using the process, no two of which consuming the same class of fuel, precisely the same results are sought, and, in some instances, claimed to have been attained, showing rather conclusively that the nature of the contents of this calcining furnace may be materially changed, the results remaining the same.

In justice to the reputation of the writer of this, and subsequent articles of like character, we wish to add in this connection, that he has no interest whatever in this or any process of paper or pulp manufacture, but being a recognised expert in this line of investigation, has been selected and employed to make the requisite tests, and prepare the results, both from laboratory practice, and

results of his wide chemical experience to do this work. To this end, any and all, whether in sympathy with his arguments, or not, are invited to propound questions, and submit tests, bearing upon the subject. This they may do free of cost, by communication with his office.—*Southern Trade Gazette.*

CHEAP STORAGE FOR APPLES.

At the last meeting of the Ohio State Horticultural Society, Mr. J. Jenkins described a simple method used by him in storing and keeping apples for the spring markets as follows:

"One of the easiest and most rapid profits that a horticulturist and farmer can take advantage of is in the proper storage of the apple crop. The October and November price of good winter keepers is seldom more than one-third to one-half what the same fruit command in the latter part of winter and early spring, so that a moderate amount of shrinkage from rotting, etc., may easily be met in the largely increased profit of late selling.

"In earlier times when there was a greater lack of cellar room, quantities of apples were preserved for the spring market by simply burying them in the orchards were grown in conical heaps first placing straw over the heaps, then enough earth, to prevent freezing And evens t the present time, some of the choicest apples that reach our late spring market are preserved in this well-knownmanner.

"Simply a modification of this old and well tried process is the method that I make the heading of this article.

"Down a hillside, a V-shaped excavation is made, which may be several feet deep and eight or more feet wide at the top, and in the bottom, extending its full length a trough is placed, made of a board one foot wide for the bottom, and boards eight inches wide for the sides, with a litle drain immediately below.

"This trough, extending up the full length, and in the bottom of the excavation, is covered with slate one or two inches wide, nailed across not over one inch apart. The sloping sides are then covered with rye straw, and apples by the wagon load are placed therein and covered with straw and earth from above to prevent frost from reaching them as is done in the old way of burying fruits.

"The trough below gives a circulation of cold air through all the apples stored above it and ends in a draft chimney at upper end. In the very coldest weather, the mouth at the lower end of the excavation may be closed; though while the thermometer remains twelve or fifteen degrees above zero, it has proved an advantage to let the cold air circulate through. But in warm weather it is an advantage to keep the draft closed, thus retaining the cold that is already there. This simple and inexpensive arrangement has preserved apples until very late in the spring with scarcely any loss and they come out for market, bright, crisp, and fresh, with no appreciable loss of flavor, and brought often treble the price they would have commanded in the best fall or early winter market."—*Farmers' Review*

HEART DISEASE.

(BY A PHYSICIAN.)

The number of people who go about their daily work with some affection of the heart, is unquestionably greater than is popularly supposed. Some of the cases are congenital, some are due to overwork but among all the causes rheumatism figures in great prominence. The food we eat affects this organ two. Meat stimulates it, and another kind of diet is "lowering." Nervous impressions also greatly affect it. Indigestion affects the heart, mayhap producing the most terrible palpitation and even syncope of fainting.

It would have been considerad a very strange thing years ago to hear one insisting upon the influence of dyspepsia, affections of the liver and of the kidneys upon the heart. By dyspepsia the stomach may become so distended as to push up and displace somewhat this organ causing a dreadful feeling of distress. By overtaxing the liver its work in the elaboration of food may be so far imperfect as to unduly stimulate the heart and cause its enlargement Again imperfect assimilative processes give rise to rheumatism and this causes the blood to deposit fibrin on the valves of the heart. Sometimes these deposits are carried from the valves into the circulation where they soon occlude some vessel. Often paralytic strokes and sudden death proceed from the detached and freed deposits Again these fibrinous deposits may cause ulceration, or they may contract and thus deform and cripple a valve Disease of the kidneys may be produced by too much meat, climatical influences, and its turn ultimately induce heart disease. Thus we see that if one of the organs suffer the heart may suffer with it. It is not necessary to go very far in the history of chronic diseases before it is discovered that a disordered nutrition is at the root of the trouble and that the first step towards correcting the difficulty is to diminish to a minimum the demands upon the organs affected.

If the stomach have more work on hand than it can comfortably accomplish, this will worry and irritate the heart; if digestion affords imperfect digestive product, the effect is evil upon the heart, the liver, and kidneys. If there is biliousness, meat should not be too freely indulged in. The same is the case with Bright's disease, and the same is the case with gout. Very specially should the victim of heart di ease who has any of these ailments bear this in mind.

Nothing conduces so much to the welfare of those with heart disease as regular habits of life, and especially matters of the table. The requirements of the organs should be attended to like clock work Some form of iron should always be taken, and a good form to begin with is Dialysed Iron, five drops three times a day. A more general tonic and heart food is the "Elixoid of quinine, iron and strychnine." It holds the organ steady, improves nerve tone enriches the blood, and except in enlargement of the heart, is the most valuable medicine known.

GREAT EXCITEMENT IN WALES ABOUT A MARVELLOUS CURE.—LIVING SIX YEARS WITHOUT GOING TO BED.

Mr. Editor,—While spending a few days at the pleasant seaside town of Aberystwith, Cardiganshire, Wales, I heard related what seemed to me either a fabulous story or a marvellous cure.

The story was that a poor sufferer, who had not been able to lie down in bed for six long years, given up to die by all the doctors, had been speedily cured by some Patent Medicine. It was related with the more implicit confidence from the circumstance, as was said, that the Vicar of Llanrystyd was familiar with the facts, and could vouch for the truth of the report.

Having a little curiosity to know how such stories grow in travelling, I took the liberty while at the village of Llanrystyd to call upon the Vicar, the Rev. T. Evans, and to enquire about this wonderful cure. Though a total stranger to [illegible] and his wife most graciously entertained me in a half hour's conversation, principally touching the case of Mr. Pugh in which they seemed to take a deep and sympathetic interest, having been familiar with his sufferings, and now rejoiced in what seemed to them most remarkable cure.

The Vicar remarked that he presumed his name had been connected with the report from his having mentioned the case to Mr. John Thomas, a chemist of Llanon. He said Mr. Pugh was formerly a resident of their parish, but was now living in the parish, of Llanddeinol.

He strongly vouched Mr. Wm. Pugh's character as a respectable farmer and worthy of credit. I left the venerable Vicar with a livelier sense of the happy relation of a pastor and people, feeling that he was one who truly sympathised with all who are afflicted in mind, body, or estate.

On my return to Aberystwith, I was impressed with a desire to see Mr. Pugh, whose reputation stood so high. His farm is called Pancom Mawr, signifying 'above the dingle' situated near he summit of a smooth round hill, overlooking a beautiful valley in which is situated the lovely ivy-mantled Church of Llanddeino. I found Mr. Pugh apparently about 40 years old of medium height, rather slight, with a pleasant and intelligent face. I told him I had heard of his great affliction and of his remarkable and almost miraculous relief, and that I had come to learn from his own lips, what there was of truth in the reports.

Mr. Pugh remarked that his neighbours had taken a kindly and sympathetic interest in his case for many years, but of late their interest had been greatly awakened by a happy change in his condition. What you report as having heard abroad, said he, is substantially true, with one exception. I never understood that my case was ever given up as hopeless by any Physician. I have been treated by several Doctors hereabouts, as good as any n Wales, but unfortunately no prescription of theirs ever brought he desired relief.

Fifteen years ago, he said, I first became conscious of a sour and deranged stomach and loss of appetite, which the Doctors told me was Dyspepsia. What food I could hold in my stomach seemed to do me no good and was often thrown up with painful retchings. This was followed after a time with a hoarseness and a raw soreness of the throat which the Doctors called bronchitis, and I was treated for that, but with little success. Then came shortness of breath and a sense of suffocation especially at nights, with clammy sweat, and I would have to get out of bed and sometimes open a door or window in winter weather to fill my lungs with the cold air.

About six years ago I became so bad that I could not sleep in bed, but had to take my unquiet rest and dreamy sleep sitting in an arm chair. My affliction seemed to be working downward into my bowels as well as upward into my lungs and throat. In the violent coughing spasms which grew more frequent, my abdomen would expand and collapse and at times it would seem that I should suffocate. All this time I was reduced in strength, so that I could perform no hard labour and my spirits were consequently much depressed.

Early in this last spring I had a still more severe spasmodic attack, and my family and neighbours became alarmed, believing that certainly I would not survive, when a neighbour who had some knowledge, or had heard of the medicine, sent to Aberystwith by the driver of the Omnibus Post, some seven miles distant, and fetched a bottle of Mother Seigel's Curative Syrup.

This medicine they administered to me according to the directions, when to their surprise and delight no less than my own the spasms ceased, I became at ease, and my stomach was calmed. My bowels were moved as by a gentle cathartic, and I felt a sense of quiet comfort all through such as I had not before realized in many years. I could walk around the house, and breathe comfortably in a few hours after I had taken the medicine. I have continued to take the medicine daily now for something over two months, and I can lay down and sleep sweetly at nights and have not since had a recurrence of those terrible spasms and sweatings. I have been so long broken down and reduced in my whole system that I have not tried to perform any very hard out-door labour, deeming it best to be prudent lest by over-exertion I may do myself injury before my strength is fully restored. I feel that my stomach and bowels have been and are being thoroughly renovated and renewed by the medicine In fact, I feel like a new man.

I have been much congratulated by my neighbours, especially by the good Vicar of Llanrystyd, who with his sympathetic wife have come three miles to shed tears of joy on my recovery.

I bade Mr. Pugh good-bye, happy that even one at least among thousands had found a remedy for an aggravating disease.

Believing this remarkable case of Dyspeptic Asthma should be known to the public, I beg to submit the above facts as they are related to me. F. T. W.

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 2ND MARCH 1887.]

Madras.—No report.

Bombay.—Reaping operations in progress in fourteen districts Scarcity of fodder and of drinking water in parts of Dharwar. Fever in parts of eleven, cattle disease in parts of six, and small-pox in parts of five districts.

Bengal.—A shower reported in Chittagong; elsewhere no rain. Weather is generally becoming warm. Early *rabi* crops and sugar-cane are being harvested with good outturn. General prospects of poppy are fair; plants are in flower, and in some places capsules are being lanced and collection of opium has begun. *Boro* rice is being transplanted. Ploughing for early rice and jute is in progress. General health good.

N. W. Provinces and Oudh.—Week rainless. Weather seasonable. *Rabi* crops are in excellent condition everywhere. Harvesting operations have begun in some places. Poppy crop promises well. Markets are well supplied. Prices are fluctuating. Public health good. Slight cattle disease reported in a few districts.

Punjab.—Health good. Prices of food-grains are still rising. R in urgently needed. Crop prospects at present unfavourable.

Central Provinces.—Weather getting hot. *Rabi* being harvested. Fever and cattle-disease in places. Prices high in Jubbulpore. Wheat risen in Raipore.

Burmah.—Except some cholera in Akyab, public health of Lower Burmah satisfactory Slight cattle disease in one district. Reports received from five districts of Upper Bu mah. Health good. Food generally sufficient, but prices rising in Shwebo. Spring cultivation progressing.

Assam.—Weather seasonable, cloudy and rainy. Pressing of sugarcane and ploughing of land for *ahu* and *dumahi* crops still in progress. State and prospects continue good. Cattle-disease still prevalent in parts of Karimgunj sub-division. Four deaths from cholera from Sadr reported, otherwise public health good. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Prospects of season continue favourable. Public health good. Murrain prevails in parts. No material change in prices.

Berar and Hyderabad.—Weather clear and warm Gathering of *rabi* crops in progress. Outturn of wheat is estimated as up to the average. *Tabi* crops prospering. General health of talukas fair. Prices steady.

Central India States.—Weather warm and clear Week rainless Wells drying up. Opium and cereal crops fair, though some slightly injured by blight. Health good. Prices steady.

Rajpootana.—Week rainless. Weather getting perceptibly warmer Tanks and wells drying in most places. Crops greatly damaged by frost in Meywar, otherwise prospects are favourable. Gram being harvested. Small-pox in Marwar and Ajmere, otherwise public health good. Cattle-disease in Merwara. Prices fluctuating.

Nepal.—Weather unsettled. Prospects fair. Prices high.

Editorial Notes.

A TELEGRAM received from London states that the deliveries of tea in February amounted to 7,380,000 lbs., bringing the stock up to 37,420,000 lbs. These figures show a great advance on last year, while the quantity that has gone into consumption during January and February shows a similar advance of not less than 3,500,000 lbs.

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THE report on the prospects of the oilseeds crop in the Punjab up to the end of January 1887, states that owing to want of rain the area under the oilseeds in selected districts is still further reduced The estimated area now is 414,000 acres. Rain is much required.

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THE report on the prospects of the wheat crop in the Punjab to end of January 1887, estimates the area under this cereal at 6,900,000 acres. There has been good rain in the districts near the Himalayas, but none in other tracts. Rain is now much needed, especially in the western districts.

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THE report on the prospects of the linseed crop in Berar up to the 15th February 1887, states that the acreage under linseed is 392,372 acres, or 36 per cent less than last year. The decrease is due chiefly to excessive rainfall at sowing time. The crop has suffered generally from untimely rainfall, and the outturn is estimated at from 10 to 12 annas. This estimate is based upon information received up to the 15th February 1887.

THE report on the prospects of the wheat crop in Berar up to 15th February 1887, estimates the acreage under wheat at 15 per cent above the average, which is 807,000 acres. The crop is now being reaped. Its condition was on the whole good, and an yield of from 12 to 14 annas is estimated. The outturn of the staple food crop of the people, *jowari* (great millet) was an average one. This information is based on returns up to 15th February 1887.

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THE sugar crop of Mauritius this year does not promise a plentiful outturn, although the drought from which it suffered in the early part of the current year was succeeded by plentiful rain about the end of January. This has, however, somewhat improved the crop prospects, but more rain is still wanted. The latest estimate of the crop does not anticipate above 90,000 tons.

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THE report on the prospects of the wheat and oilseed crops in the North-Western Provinces and Oudh, up to 22nd February 1887, is as follows:—"There was heavy rain in Bundelkhund and parts of the Allahabad and Rae Bareli divisions between the 10th and 12th December, but the regular winter rains did not commence till 4th January. The showers in January were copious and did much good, but cloudy weather caused fungoid diseases which affected both wheat and oil seeds. In February frost was severe and the early crops on outlying unwatered land suffered seriously. Taking 100 to denote full average condition, the February condition of the present wheat crop of the United Provinces was 75, and of oil-seeds 60. Frost is reported to have destroyed fully half of the *urhar dall* crops, and much of the peas and gram crops. This forecast relates to the condition of crops up to 22nd February 1887."

Indian Engineering publishes an explanation which has been offered as to why palms act as lightning protectors : " Electricity always takes the less resisting medium, and air (especially dry air) being the worst conductor, it is natural that high trees and buildings will be chosen in its passage to earth ; then, as water (especially acidulated water) is the best conductor, the fluid will choose the most sappy trees though they may not be the highest. As cocoanut trees are the first high points which the monsoon clouds meet on striking the coast line, it is natural that they should be the greatest sufferers, and as a single cocoanut tree is not sufficient to carry off the fluid, other trees, within a more or less extended radius, according to the quantity of the discharge, are also affected."

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THE same paper has the following regarding Rhea fibre :- " Ramie, Rhea or China grass is a fibre which has been in use in India, China, and other tropical countries for a very long period, and though the strongest fibre in nature, it had never come into anything like general use for the want of machinery that would make it marketable. Machinery has been invented lately to meet the want, and it is a question whether this fibre will not now enter into competition to some extent with silk and wool. Ramie is nearer in appearance to silk than any other fibre, and it is stronger than either wool or silk, it will mix with either and give strength to both. And what is of most importance, it can be produced cheaper than flax, hemp, or cotton "

AN experiment was carried out at Mysore a few days ago with the centrifugal sugar crystallizer introduced by Messrs. Thompson and Mylne with success into Behar and other parts of the country. In this case the rab used was only about a day's standing, as only 24 hours had been allowed for the syrup to crystallize. This was of the consistence of unground mortar when put in the centrifugal. Almost all the molasses drained away within five minutes of work to the astonishment of the professional manufacturers, who had been called to attend the process. About a seer-and-a-half of clear water was then poured into the sugar, as it was being worked upon in the machine; this removed the residue of the molasses, and after two or three minutes of further work the whole was perfectly dry for weighing. The rab used weighed 65 seers. This gave 31½ seers of rappoory sugar, the remainder having drained in molasses. This was pronounced to be a perfect success by the professional sugar refiners.

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WE were not aware that the fibre had been in use in India for "a very long period." The plant has certainly been known in this country for many years, but no use appears to have been made of its fibre for weaving into cloth; though there has been a great deal written about it. So far as China is concerned, the fibre has been used there for a period unknown, and the cloth manufactured from it received the name of "Grass cloth"; hence the Rhea (*Bœhmeria nivea*) came to be known as the "China grass-cloth nettle." We have always regarded the Rhea as a very important economical plant, but the difficulty hitherto has been to find a method for decorticating the fibre in its green state at a cost sufficiently low to render it remunerative. It is only in the green state that the fibre can be decorticated satisfactorily, and in this it differs from jute, hemp or flax. Moreover, the latter can be decorticated at so low a cost, as to completely run Rhea out of the field of competition with them. There cannot be two opinions about the great superiority of Rhea over every other fibre known to us in point of strength (silk excepted) softness and adaptability for mixing ; and now that Mr. Maries of Durbhanga has discovered a process by which it can be decorticated and worked up at a comparatively low cost, we may soon hear more of the Rhea taking a prominent place in commerce.

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 2nd March 1887 :—The week under review has been rainless. No reports have been received from Madras and Coorg. The *rabi* harvest is now in progress in Bombay, Bengal, the North-Western Provinces and Oudh, the Central Provinces and in Berar and Hyderabad the crops are generally in excellent condition, and a good outturn may be anticipated. In the Punjab the prospects of the *rabi* are unfavourable generally throughout the province owing to the absence of rain, which is urgently needed. In Central India and Rajpootana crop prospects are generally good, though injury from frost in Meywar and Kerowli is reported. In Mysore the outlook is favourable. The spring ~~rice is being trans~~planted in Bengal and the land is being ploughed for the early rice there, and in Assam where sowings have commenced. Poppy is in flower in Bengal. In the North-Western Provinces and Oudh the collection of opium has just commenced and the crop promises well. The sugarcane harvest continues in Bengal the North-Western Provinces and Oudh, and Assam. Scarcity of fodder is reported from parts of Dharwar in the Bombay presidency, and from Shahpore in the Punjab. The public health is generally satisfactory. Prices are fluctuating in the North-Western Provinces and Oudh, are still rising in the Punjab and some States in the Rajpootana Agency, and are also high in Jubbulpore in the Central Provinces. Elsewhere they are generally steady.

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THE cocoanut oil industry is an important one in Ceylon, and any circumstance that tends to lower the quality of the oil produced on the island, is naturally regarded with much anxiety. Recently it was found that Cochin oil fetched a higher price in the English market than Ceylon, and this has given rise to an animated discussion in the Ceylon press as to the relative merits of the two oils. Thus a Colombo paper writes :—Referring to the recent discussion on this subject in our columns, a merchant who has had longer experience perhaps, than any one in the Island in the oil trade, informs us that Cochin oil has always been considered richer in stearine than Ceylon oil. The fact must, therefore, have been ascertained by analysis in England, where Cochin, we are told, has been mainly used in the manufacture of candles, Ceylon being chiefly used for soaps. Even for the latter purpose, Cochin beats Ceylon owing to its whiteness, which we are now emulating and which, we fancy, can easily be attained by the rejection of smoke-dried and blackened copperah. Whether this is worth striving for is another matter, the decision on which must depend on results. If it pays the manufacturer better to purchase black and inferior stuff, which generally goes by the name of cart copperah, at Rs. 4 or 5 a candy less than clean white boat copperah fetches, he will continue to use it in his mills. The question is whether the difference in price between white oil and ordinary oil is sufficient to compensate for the higher rate demanded for clean sun-dried copperah, for which there is a good inquiry both in continental Europe and in India. The distinction of being first in the list of oil-producing countries will hardly be sought for by mill-owners at the expense of their pocket.

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THE question of stearine is different from that of the whiteness of oil, and it is in respect of the former that the Agricultural Association should institute inquiries. Is the poverty of stearine due to deficiencies in the soil, or to the mode of preparation? If to the former, how can the soil best be enriched in the constituents it needs ; if to the latter, what changes in the mode of drying the kernel and extracting the oil are called for? The services of an agricultural chemist are in any case needed, and should be put into requisition, so that by analyses of soils, oil and copperah, a solution of the difficulty may be suggested. Even to the unprofessional mind it must seem reasonable that ripe nuts should be richer in stearine than immature ones; but does the mode of drying them also affect the fatty substance in oil which gives it its special value? If the temperature at which oil congeals is a test of its richness in stearine, it is worthy of note that cold drawn oil, or oil extracted from the kernel slightly dried congeals sooner than ordinary chekkoo or mill oil. This would seem to suggest that too much heat, whether in drying the kernel or extracting the oil reduces the stearine. The inquiry is an interesting one, and may beneficially affect our trade in oil, and as such deserves the attention of the Association. The

normal difference in price between Cochin oil and Ceylon is, we are assured, only from £3 to £4—the difference of £11 per ton recently reported being confined to London, and due to some jugglery among speculators. Still, a difference of £3 to £4 is not immaterial, and is worth striving for.

COFFEE has aroused considerable discussion of late, due most probably to the fraudulent manner in which it is adulterated by retail dealers at home with chicory and other compounds: An English exchange notices that some interesting experiments have recently made by Dr. B. H. Paul and Mr. A. J. Cownley on coffee berries in the unroasted state, and the results as published by them have revealed several important facts hitherto imperfectly understood or erroneously recorded in chemical literature. Many varieties of raw coffee it is well known, come into our markets and their value varies so greatly that it is natural to suppose that their quality so far as caffeine contents is concerned may vary proportionately, and a semblance of reality is given to this supposition by the published data, which put down the percentage of caffeine in raw coffee from a fraction of 1 per cent to as much as 3·61 per cent. Dr. Paul and his coadjutor have examined altogether about a dozen different kinds of coffee, and find that instead of the percentage of alkaloid being variable,it is wonderfully constant;for example,Coorg coffee beans yielded 1·1 per cent (the minimum,) while the maximum, 1·38 per cent was shown by Liberian coffee, the variety which has been found to withstand climatic influences under which all others succumb. Continued experiments corroborate the first results, and it is fairly established that pure coffee may be judged by the amount of caffeine which it contains, about 1·3 per cent being taken as the standard for roasted coffee. Consequently, the fraudulent sale of mixtures of coffee with chicory or other less valuable substances is now rendered easy of detection by Paul and Cownley's discovery, and they have rendered important service to chemical analysis by it. Another statement which they appear to have disproved is that Caffeine is volatilised from coffee beans during the roasting process, for they find that the roasted beans contain proportionately the same amount of alkaloid as the raw beans.

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BEE KEEPING in India has lost its most ardent advocate in Mr. J. C. Douglas,of the Telegraph Department, who died of cholera a few days ago at Nellore in the Madras Presidency. We regret very much to record this sad event, the more so as Mr. Douglas died under peculiarly pathetic circumstances. A contemporary pays the following touching tribute to his memory:—"It may be remembered that about a year ago Mr. Douglas went on leave with his wife who was not in good health, and died at Marsellies. Mr. Douglas was deeply attached to her, and he had her remains placed in a leaden coffin and conveyed to her native place, where they were interred,and a suitable monument erected to her memory. Very different has been the end of Mr. Douglas himself. On his return from leave he was deputed to the Gangam Division, and was in the somewhat wild district of Nellore. There he was seized with cholera and away from skilful medical aid, he died after a short illness. There was no loving partner to do the last offices for him as he had attended to his wife. Still he received such, kind attention as was possible at the hands of his brother-officers of the department. There were no undertakers there ; no appliances for funeral pomp; and there was nothing for it but to do the best that circumstances permitted. The remains were placed in a packing case ; a brother officer dug a grave for him in the jungle, read over him the service for the burial of the dead, and "left him alone with his glory." This seems a sad end ; but one to which Englishmen are always liable in the discharge of the duties they undertake in this or any other undeveloped country. Mr. Douglas may be remembered for his persistent efforts to establish a bee industry in India. He devoted a considerable portion of his leave in selecting various kinds of bees in the hope of acclimatising them in this country."

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THE irrigation operations in the North-Western Provinces and Oudh during 1885-86 do not appear to have been as favourable as in previous years. It must be noted here that a plentiful rainfall is detrimental to the successful working of the canal department ; and that it is only in seasons of drought and scanty rainfall that the operations of the department can be carried on with satisfactory results, both to the ryots and zemindars who resort to the canals for water for irrigation purposes, and to the assets of the irrigation accounts. We thus note that the rainfall over nearly the whole tract of country commanded by the canals was much above the average, and in many places more than double that of the average for the last ten years. Exceptionally heavy falls of rain occurred in the middle of July in the Bulandshahr and Aligarh districts, which caused very high floods along the valley of the Kalinadi and did a good deal of damage. The aqueduct at Nadrai on the Lower Ganges Canal was entirely carried away, and every road or railway bridge over that river below Bulandshahr was either totally destroyed or seriously injured. Fortunately a supply of water for the lower canal was obtained from the upper canal, so that there was no difficulty in meeting the demand. The canal-irrigated area, however, decreased by 71,359 acres, which was less than in any year since 1880-81. This occurred chiefly in the districts irrigated from the Upper Ganges Canal, where the rainfall was abundant. Notwithstanding the abundant rainfall, the total area irrigated for both the *kharif* and *rabi* crops showed an increase of nearly 100,000 acres over the previous year, but there was a large falling off in the demand for water for indigo, which is accounted for by the low prices realized for the produce in the previous year, and by the serious losses sustained by the heavy rainfall and floods of 1884. The total mileage of irrigation works of all descriptions open during the year was 9,397 miles—an increase of 313 miles as compared with the previous year. The total capital expenditure up to the end of the year was Rs. 7,51,49,595, and the net revenue, after deducting working expenses, was Rs. 35,44,263,or 4·72 per cent,which may be considered a favourable return for the Government outlay.

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WE are not sure that what are known as 'special fertilizers' at home and in the United States, are used to any extent in this country for the purpose of replenishing the soil, even for experimental purposes on our experimental farms and agricultural stations. The following remarks, however, on the subject by an esteemed American exchange might prove useful to some :—

The erroneous idea, still held by some persons, that concentrated fertilizers are stimulants and not manures is one of the principal causes which keep so many farmers in poverty. Millions of acres of land now tilled at a loss to their owners could be made to yield profitable crops were it not for the want of knowledge about the actual workings of, and the results from the use of, skilfully prepared commercial fertilizers. We do no wish to be understood as deprecating or discouraging in the least the careful husbanding and the plentiful use of yard manure ; nevertheless, experience has proved indisputably that properly and honestly made " complete " as well as " special " fertilizers do not exhaust the soil, and are as lasting in their action as yard manure—more so, even, in some cases. Our own experience with various commercial fertilizers has convinced us that with judicious use of the " Mapes Manures " worn out lands can be restored to fertility quicker, and with less expense, than in any other way, and that their use in addition to yard manure produces paying returns, notably so in the case of " special fertilizers." The name " special" may be somewhat misleading as to their general adaptability ; for although fertilizers may have been prepared for special crops, it should not be supposed that they are of no value for other crops. Their composition is based upon the fact that all plants do not require the various elements of plant food in the same proportions ; it would therefore be waste to apply high-priced fertilizers indiscriminately to all crops alike, without regard to their special requirements. Special fertilizers are special in this sense only, that they contain the elements of plant food in the exact proportions required by the crops for which they are intended, without leaving any unnecessary surplus which the plants cannot assimilate Properly prepared special fertilizers are therefore, as a rule, the cheapest manures obtainable, especially on light or leechy soils,

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WITH reference to the exhibits of sugar mills at the Saharunpore Agricultural show, a notice of which appeared

in one of our local 'dailies,' and an account of which will be found in another column, Messrs. Thomson and Myine write as follows :—

With reference to the report in yesterday's *Englishman* of the Saharunpore Agricultural Show, will you allow us to say that we went there (on very short notice) under the impression that we were invited to exhibit our sugarcane mills at the show, and that the bar was withdrawn which had been put on them because they had obtained the first prize on several occasions? We found it still in force, and so came away. As we never entered on or for any competition at Saharunpore, it is not fair to say that we withdrew from one. Mr. Rogers was told that, before any satisfactory competition could be entered on, the conditions on which it was to be conducted and the points to be decided would need to be arranged. One of the prime questions with regard to such a machine is whether it will suit the native cultivators and work well in their hands for any time (as ours do) notwithstanding the extremely rough treatment it must meet with in such hands. We were not informed until afterwards that Mr. Rogers' new mill had not yet been subjected to this test.

We also found that the mill which Mr. Rogers proposes to put in competition with ours contains several devices which we tried some years ago, but were compelled to give up as unsuited to machines which are to be worked in the fields and villages, and have to be handed over to the care of native cultivators and their helpers. Chilled rollers we tried eight years ago, and had to abandon for reasons which are very clearly shown by some we have here, which were brought back to us after being in use a short time, and for which we gave unchilled ones in exchange. The report says that "the frame of Mr. Rogers' mill being of wrought iron very severe pressure can be brought to bear without risk of damage to the mill." The frame of our mill also is frequently made of wrought iron, as also of steel; but in its most popular form it is made of hard rough wood, as this admits of all parts except the rollers being repaired in the village. In this form all the pressure needful can be obtained, and when well made it does good work for eight or ten seasons with only such small repairs as can easily be given by the village carpenter or smith. Such mills are now being brought to us which have been working for eight seasons, and, with slight repairs, they will do good work for two or three seasons more.

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THE knol-kohl or kohl-rabi, is a vegetable familiar to us out here for many years past ; but the following observations by that very practical journal, the *American Agriculturist*, regarding this vegetable, will probably be read with interest : —

Kohl-rabi, sometimes called the turnip-rooted cabbage, is a vegetable seldom seen in our private gardens, though it is quite common in the market, where it is mainly purchased by the Germans. It is in common cultivation throughout Northern Europe, not only in gardens but as a field crop, it being an excellent food for cattle —as valuable as ruta-bagas, and more easily raised. Kohl-rabi is a variety of the cabbage, in which the stem swells out to form a sort of above-ground bulb, which, when young, is fleshy and tender and regarded by many as superior to any variety of turnip. The bulb of the older varieties is either globular, or strongly flattened above and below, being shaped like the early turnips. There is a cluster of leaves above and a root below. The bulb grows entirely upon the surface of the ground and has been called the "Above-ground turnip." The exterior of the bulb is green, or in some of the varieties purple. If used before it gets too large kohl-rabi is a delicious vegetable, superior to any of the varieties of the turnip If allowed to get too old, it rapidly becomes filled with tough, string-like fibres, which render it quite uneatable.

This form of the cabbage is thought to have originated in Germany, at any rate it was first introduced into England from that country, no longer ago than 1837, where it soon took an important place as a farm crop in some parts of that country In several of the counties of England kohl-rabi is regarded as superior to ruta-bagas, or any other kind of turnip, and the points in which it is superior are those which commend it to the attention of the farmer of this country. The great difficulty in the cultivation of the ruta-baga is its susceptibility to drought, which even in so moist a climate as that of England often greatly diminishes the yield. Another drawback is the many insects which attack and injure it An eminent English agricultural writer says of kohl-rabi: "It is the bulb of dry summers." The greatest obstacle to the cultivation of root-crops in this country is the hot and dry summers, and farmers and dairymen should try kohl-rabi, which looks like a root, but is not one, as a substitute.

The catalogues give several varieties of kohl rabi differing in colour and form of the bulb. We now present another new kind, the "Bohemian" Our correspondent, Mr. J. Pederson, in Denmark, sends us an engraving and a description of his new variety, from which we select the principal points. Its peculiar shape is quite unlike that of the older sorts, and in weight the bulbs are more than twice that of any others. This has produced both green and purple sub-varieties. Mr Pederson highly ~~commends the~~ use of kohl-rabi for milch cows, stating that when fed in moderation it does not affect the taste of the butter. He also commends this variety as a table vegetable, for which use it should of course be taken while very young, before it becomes filled with fibres.

IT is always satisfactory to have intelligent native opinion upon any subject which concerns native interests intimately : especially is this of importance in the matter of native agricultural education. We have therefore read with much interest the letter of Mr. Mudaliyar D. C. Ameresekere on "native agriculture and agricultural education in Ceylon," published by the *Tropical Agriculturist*. Our contemporary introduces Mr. Ameresekere as "one of the most estimable and intelligent of Sinhalese country gentlemen we are acquainted with," who says :—

1. That the children of the agricultural classes now attending the village schools stay in school for a very limited period, and leave it in a helpless condition. The little learning, which is not very often more than an imperfect knowledge of reading and writing is of no avail for them to get a permanent livelihood, nor are they accustomed to do any trade that their parents have hitherto done. Moreover, most of the lads at the present day think it a disgrace to work in a field or garden after having been in school for some time. These lads when they are grown up try to earn food and clothing in various trifling and ineffectual ways, and failing to attain their object, they resort to vicious and unlawful means, loathing work and those who work. It is, therefore, perceptible to all, and to me particularly (being a resident in the interior) that in this manner the island is gradually going down in wealth and civilization.

2. That my opinion as regards the establishment of village schools is summarised as follows :—An allotment of jungle land of the extent of ten acres or more, a sufficient supply of agricultural implements, and a teacher should be given for each school by Government. The parents of the children should fell down the jungle and put up a school bungalow, with accommodation for the teacher to reside in. The school should be kept for six hours, three of which should be spent in learning reading, writing and arithmetic (of the native language), and the remaining three for garden work. The land in this case may be divided among the pupils of the school and be planted with cocoanut, jack, areca-nut, and other fruit bearing trees, together with yams and vegetables of different kinds according to the nature of the soil. When the school is in existence for five years the entire land allotted for the school will in this way be planted and the greater number of the trees will be bearing. An acre of the land will then be worth about Rs. 300, the same acre in its wasteful state would not have been disposed of by Government for more than Rs. 10. One-half of the planted land should be given to the pupils of the school, the other half to Government. By this means a considerable sum may be added to the revenue also. The schoolmaster should be entitled to half the yams and vegetables grown on the land and the pupils to the other half. The teacher is here able to raise a considerable sum, hence a schoolmaster who is now working for Rs. 20 per mensem will be willing to work for Rs. 15, as he will be able to raise over Rs. 5 a month by his share of vegetables, &c.

3. When the land has been fully planted, the school may be shifted to a like piece of ground, and the same operations being carried on like results may be obtained. A child who attends school at the age of five will be able to cultivate three pieces of land before he reaches 20. At this age he can leave school as a civilized and experienced cultivator with a certain amount of property which is probably worth more than Rs. 500, and with a thorough knowledge of reading, writing and arithmetic. The descendants of the refined agriculturists will then have reason to think that these two (cultivation and learning) are the natural courses that children have to take up, and will no more entertain the erroneous idea that work is a disgrace.

4. When village agricultural schools are established in the manner I have indicated the parents of the children in the interior will be too glad to give a helping hand to education for its dissemination. I am of opinion, therefore, that this method will be one of the best plans by means of which the wealth and civilization of the island may be raised to a higher standard.

The foregoing letter was addressed by the writer to the Public Instruction Office so far back as 1884, without eliciting any acknowledgment.

THE IMPROVEMENT OF DRAUGHT CATTLE.

[*By Hakéem Mahomed Mukarrab Hossain Khan, Meerut.*]

It has often been suggested that there are three causes that render the soil in this country less productive than it ought to be, *viz.*, 1, the ignorance of the cultivating classes generally; 2, the use of defective implements; and 3, the want of stamina in draught cattle. It is the last of these causes that I purpose discussing in this paper; but a few remarks of a prefatory nature may not be amiss. The sons of the cultivating classes—especially zemindars—may acquire a kind of knowledge of agriculture in Colleges established for the purpose of imparting instruction in this subject, but they may learn much from a perusal of journals devoted to agriculture. By this means they will become acquainted with many facts brought together, and by applying them practically on their own farms and holdings set an example to others in the country to do the same with much advantage. New and improved implements are constantly being imported into this country, while the officers of the Agricultural Department in the North-West Provinces have been making praiseworthy efforts to introduce them to the notice of the cultivators for some time past. The great need of this country is, however, a really useful plough. To my mind Duplay's plough answers all the purposes of the Indian ryots, but it has not attracted sufficient attention from the fact that the ryots know full well that their cattle are not quite equal to the requirements of this plough. And this brings me to the subject of my paper.

In agriculture, the first point worthy of consideration is the fitness of draught cattle for the work required of them. The seed grain may be of the first quality; the cultivator may be well up in the art of farming, and the soil and the plough of the best: but if the cattle are weak and unfit for the work required of them, all these advantages will, comparatively, count for very little. It is therefore with peculiar satisfaction I note that the Agricultural Department of these provinces is at present occupying itself with the question of improving the indigenous breeds of cattle. In this connection I see it is proposed to substitute pairs of bullocks and bulls for breeding purposes for money-prizes at future agricultural shows. However good this course may be, it can only bring about insignificant results in the long run: and something having a wider field for action should be done. I do not, of course, deprecate the giving of live-stock as prizes in place of money, but what, in my humble opinion, would tend to bear better fruit would be for the Government to establish at certain centres in N.-W. Provinces flocks or herds of cattle—cows and bulls of the best breeds procurable, something on the system of Government studs for breeding horses. There is, however, the question of pasturage; and as it would entail a considerable loss to purchase pasture lands, I would suggest that *khadar* lands—such as are left uncultivated, and consequently have plenty of good pasturage, might with advantage be utilized for this purpose. I would then dispose of the stock raised at these centres to the cultivators at sufficiently low prices to come within their means, while at the same time leaving a small margin of profit to Government The Government as a state landlord and owner could carry out a scheme of this kind, whereas a private individual could not, without laying out a very large sum of money which he could perhaps not command. In the second place, I would organize circles of ten villages each, and would entrust the zemindars with a bull or two, as the case may be, with the distinct understanding that all the cows of any good breed must be covered by these bulls, either free of charge or by levying a small nominal sum as is the custom among the villagers themselves. The zemindars should, moreover, be required to keep a list of all cows covered by these bulls, and the "Girdawar Kanoongo," or some other tehsil officer should now and again see for himself that the offspring of such cows were well fed and properly cared for; and preference should be given to these in the distribution of awards at agricultural and cattle shows. In the next place I would induce the more important zemindars and talookdars to keep small herds of such cattle on their own account for breeding, and occasionally supply them with bulls of good breed. If these suggestions are given effect to, I have every hope that before long we shall have draught cattle of the very best breeds India can produce scattered throughout the country, at any rate in Upper India.

HORSE AND AGRICULTURAL SHOW AT SAHARUNPORE.

The above show appears to have been more of a success than has attended its predecessors. According to a correspondent, it was brought to a close on the 26th ultimo having been opened on the 22nd idem. The specimens of horses exhibited were a great improvement on those of former years, both in respect to numbers and quality. The brood mares were a remarkably fine class, and the improvement in the numbers of geldings and mules exhibited was especially satisfactory to the officers of the Horse-breeding Department. The show of young stock was disappointing, but the best youngsters are apparently reserved for the Hurdwar Fair. The Remount Committee picked up only one recruit, and this one was purchased from a dealer in the city, and not at the show.

The agricultural part of the show was also much better than usual, notably in the number of exhibits in the Produce Department; and now that the cultivators have begun to take an interest in presenting good specimens of the produce of their fields, and a start has been made, rapid progress may be anticipated. In the Implement and Machinery Department, the collection exhibited by the Director of Agriculture and Commerce appears to have been a great source of interest to the zemindars and cultivators. The Centrifugal sugar separator was much admired, though its cost, Rs. 400, is practically prohibitive. The double chain pump worked by one bullock promised well, and was regarded as the best thing of this kind as yet introduced. An important exhibit in this department was the Rogers' Sugar Mill, invented and patented by Mr. Arthur Rogers, C.E., of the Oudh and Rohilkhund Railway. This mill is apparently a development of the Beheea Sugar Mill. The rollers are of chilled iron, and the frame is of wrought iron; and it is claimed that thus very severe pressure can be brought to bear without risk of damage to the mill. The Beheea Mill was barred from competition for the prize for the best sugar mills owing to its having carried off the prize on previous occasions, but a special prize was offered by Mr. Wyer, C.S., open to all sugar mills. Mr. Thomson, of Beheea, arrived on the ground with the object of competing with a Beheea Mill of the newest pattern, provided the bar was removed but finding that it still existed, he withdrew from the competition.

A new and important patent was exhibited, which is likely to prove of much value to the military authorities. This is an invention for compressing *bhusa* so as to make it portable for transport. A Committee including several military officers, sat to examine the fodder prepared under this process and subjected it to the most severe tests by fire and water from which it emerged unscathed The President of the Committee, Colonel Ben Williams, was so much struck with the extreme value of the invention that he at once telegraphed to his Excellency the Commander-in Chief to ask him to break his journey up-country at Sharanpore to enable him to inspect the compressed fodder. The Correspondent has omitted to mention the name of the inventor. The show was brought to close by a Durbar held in the handsome pavilion erected on the show ground for the Jubilee celebration by Mr. Irvine, Magistrate and Collector of the District. The Director of Agriculture and Commerce, Mr. Donald Smeaton, addressed the Durbar in Urdu and congratulated the assembled zemindars on the great improvement he had observed. He went so far as to tell them that the Sharanpur show of 1887 was the best all round he had seen in the province. The prizes, some 400

in number, were then distributed to the successful exhibitors and a display of fireworks brought the show work to a successful close.

DISEASES OF SILKWORMS.

In a previous article we drew attention to the diseases to which the silkworm is liable, and last week a local contemporary announced that *pebrine* was playing such havoc among the silk filatures of Bengal at the present time as to threaten the total extinction of the silk industry in this Presidency. A writer in a recent issue of the same paper deals at length with the subject. He begins by saying that the "time has come when something should be written of the diseases of silkworms which have wrought such havoc among the Bengal filatures during the past year." He prefaces his communication with the remark that the facts brought forward by him are chiefly taken from *L. Pasteur's Etudes sur la maladie des Vers à soie*; Mallot's *Lecons sur la Versa soie du murier*; Riley's *Report of the Entomologist, U. S., for* 1885, and Mr. Wood Mason's *Report on a visit to the silk-districts of Bengal in December last.*

Our own remarks were founded upon M. Pasteur's work in this connection; but as we have not seen the other authorities consulted by the writer, we cannot do better than reproduce the facts as put together by him; we should certainly have liked to have seen Mr. Wood-Mason's report:—

Of the numerous diseases said to affect silk-worms, it is now generally agreed that there are only four well marked forms, known as the *grasserie, muscardine, pebrine*, and *flacherie*, all of which seem to occur in India. Mr. Riley declares that *grasserie* does not appear in the the moth, and cannot therefore affect her eggs. Mr. Wood-Mason would identify this disease with that called *rasa* by the natives of Bengal which, Mr. Wood-Mason says, is recognisable in its final stages, at all events, by the swollen, stretched, and distended condition of the whole body which present festooned outlines and an unwholesome-looking yellow colour (due to the germing and fat laden) yellow blood showing through the disorganised skin and cuticle. In the blood of chrysalises brought to Mr. Wood-Mason from Ghatal, and said to have been affected during their caterpillar life by some disease, he found an organism belonging to the genus *Sarcina*, but no *pebrine* corpuscles. This same organism has been found in great multitudes in packets, in tetrards, and as single coccl in all the worms affected by this disease examined by him. It remains to be proved whether this *Sarcina* is the cause of this disease, which would seem to answer to that called *grasserie* by the French.

Mr. Riley observes that the *muscardine*, though it may be so slightly developed that the worm is permitted to spin, will invariably destroy the chrysalis, while the disease can never originate at this stage as the insect is protected by its cocoon. The moth, if kept free from the infected larvæ, is never afflicted with *muscardine*, and her eggs therefore cannot contain its spores. Mr. Wood Mason identifies the *muscardine* with the disease known as *chuna* by the natives of Bengal, and as *calcino* by the Italians. It is easily recognized by the dead bodies straightening, stiffening, acquiring a dirty rosy hue, and gradually drying instead of putrifying; by their undergoing, in fact, a gradual mummification, the final stage of which consists in the dead caterpillars becoming coated more or less completely with a pure white chalky substance (whence its name), consisting entirely of the external fructification of an internal parasitic fungus belonging in all probability to the genus *Botrytis*. This disease is nearly certainly one and the same with the *muscardine* of Europe, which is called *Botrytis bassiana*. On one occasion, in the large village of Bachera, opposite to the field of Plassey, Mr. Wood-Mason saw a rearing tray, a huge structure over five feet in diameter, every one of whose layers of dung and mulberry debris was thickly strewn with whitened corpses.

The disease called *flacherie* or *flaccidity* appears to be identical with the *kala sihra* of the natives of Bengal, which may be recognised by the dark pulsating stripe (due to the heart filled with dark blood showing through the integument) which runs along the middle of the back nearly from one end to the other of the insects affected. Mr. Riley gives a detailed account of this disease which I quote here:—"When after the worms have passed their fourth moult, and are eating well and regularly, they have all the appearance of perfect health and vigour, some will often be seen to crawl to the edges of the trays and lie there languid and without motion. But for the loss of their wonted activity and the cessation of their naturally voracious appetite, one would still think the worms in full possession of perfect health, for they still retain all their outward perfection of form. In colour they have become more rosy, especially if the disease is in a virulent form. On touching them however, we find them soft, and even in this, apparently, live condition they are often dead. Had the worms been carefully observed at this time, it would have been seen that the beating of the dorsal vessel was gradually becoming slower, and that it finally stopped altogether, and that the worm was excreting a dirty liquid which soiled the anal orifice and gradually closed it. Before many hours are passed the skin begins to shrivel and draw in around the fourth and fifth joints of the body, *viz.*, those two lying between the set bearing the legs proper and the set bearing the pro-legs. Later at this restricted point the body begins to turn brown, then black, and the whole worm is soon in an advanced stage of putrefaction. Then and even before the death of the worm, a sour odour is perceptible in the rearing-house due to the fatty, volatile acids exuded by the victims to the disease. Should the disease attack the insects at a later period, when they are ready to spin their cocoons, the same languishing air will be observed: they will show a reluctance to crawl up into the arches, and will be seen to gather around their base, seeking some place to spin their cocoons which it requires no exertion to attain. Many of those which reach the branches stretch themselves out motionless on the twigs and die there. They are to be seen later hanging by their pro-legs in different stages of putrefaction." When the symptoms given above are not sufficiently clear, recourse should be had to a microscopical investigation of the intestines, in which will be found a mass of undigested food, and the coats of the intestines will appear opaque. There will also be found the bacillus of putrefaction, with or without a bright nucleus, and a special form of ferment, in the shape of short chains, the links of which are almost spherical in form. These two parasites are sometimes found together and sometimes separately. When the bacillus is abundant, death quickly follows its appearance, and the disease, spreading rapidly, will sometimes destroy a whole school in a single day. At times, this bacillus appears so short a time before the spinning of the cocoon, that the worms are able to mount into the branches and even make their cocoons, and become chrysalises. Then, however, the disease overcomes them, and their putrefaction produces foul cocoons. This case is, however, more rare, and in general the bacillus is not often found in the chrysalis. When the ferment alone appears, the disease progresses differently. The worms then show the same languor on the approach of the spinning period, and the same indisposition to make their cocoons, but even then, they mount the branches, perform their work of spinning, are transformed into chrysalises, and then into moths, which may have a fine appearance. The silk crop may even be exceptionally good; but where this state has existed, when the worm has been languid at the time of spinning, then though cocoons and moths appear well, the next generation will show a predisposition to succumb to disease and a general debility. Only in this way is *flacherie* hereditary. As in most places the filature owners are not able to watch the process of breeding, M. Pasteur has shown how the disease may be detected in the chrysalis, so that if the stock be unfitted for egg-production, the cocoons may be stifled, and their value not injured by the emergence of the moth. His procedure is to take some twenty chrysalises as samples of a stock, and if possible, some seven or eight days after the process of spinning has begun. Then take one and cut away with a scissors the wall of the thorax so as to reveal the stomach, and draw this out with a pair of tweezers. The restricted part of the digestive tube, which unites the stomach with the urinal sac, should then be cut. The anterior part of the digestive tube now alone holds the stomach in place, and this easily gives way. Lay the small ball thus withdrawn on a glass slide, and scratch away the very soft fatty envelope which covers the interior. Of this interior substance take a piece as big as a pin's head, wash it with a drop of distilled water, place it on a slide, and examine with a power of 400 diameters, when if present, the short chain-like ferment with spherical links will appear. The causes of the disease are primarily the filthy state of the rearing apparatus,—and the remedy the destruction of all insects affected, so as to prevent reproduction by them.

We hear that the representatives of the Hyderabad Company have already commenced prospecting for diamonds in the vicinity of the once famous mines of Partial. It is from these mines and others to the south of Hyderabad that the famous Golconda diamonds were dug centuries ago. The Kohinoor itself is said to have been found here.

BOMBAY COTTON CROP.

The report on the prospects of the Cotton crop in the Bombay Pesidency up to the end of January 1887 is decidedly favourable. The last report, published a few months, ago, gave a hopeful view of the crop, which the present one fully bears out. The following are the particulars :—

GUZERAT

Ahmedabad.—The area under cotton is about 283,000 acres or 10 per cent. below last year and 11 per cent. above average. Owing to excessive moisture early in the monsoon, sowing was much retarded. The long break in the rainfall in September was very trying to the plants. But the fall in October was everywhere opportune Frosty and cloudy weather in January was more or less injurious to cotton throughout the district. The whole outturn is estimated at 60,300 bales, Except in parts of Gogo the crop has not yet been picked, so that there is no trade going on in new cotton.

Broach.—The area is about 213,600 acres, that is 1 per cent, above average, but about 12 per cent below last year Cotton is grown all over the district The rain did not become general this year till after the middle of June, when a good and general fall was followed by a break, at a time most opportune for sowing. Rain then recommenced and continued favourably till the middle of July when, except in Hansot, it became excessive, and in many places washed the seed out of the ground. The break in the last week of that month was very opportune, and the land which had been damaged as above mentioned was re-sown. The fall was sufficient to cover the long break at the end of that month The light showers early in October were very opportune. About the middle of that month the fall was injurious The break in the last week of October was very favourable, but the warm, cloudy weather which followed at intervals brought on a disease called "chasia," causing a white coating over the leaves and retarding the growth of the plants. This disease has been stopped by the cold weather though it lingers in one district. The plants have everywhere borne pods which in some parts of the district have begun to open. Injury from frost on the 6th and 7th February is reported especially in *gorat* soil. Here the yield is estimated at not more than 2 annas In the other talukas the estimated yield is said to vary from 6 annas to 12 annas The estimated outturn is 34,000 bales. There is as yet to trade in new cotton.

Surat.—The area is about 101,000 acres, that is, 8 per cent. above last year and about 23 per cent, above the average of the last seven years. In the three southern talukas scarcely any cotton is grown. In many parts, the continuous fall of rain which lasted for about a month between the 24th June and the 24th July retarded cotton sowing and washed away the seeds sown at intervals during that period In the beginning of August there was a break with light showers, favourable for completion of sowing and for re-sowing fields flooded by the heavy rain of July Heavy rain from the 15th of that month was slightly injurious to the newly-sown seed, so that on a favourable break occuring at the end of the month, some of the land was sown again. The long break in September was injurious but in October the crops were revived by a favourable fall. The cloudy weather in November was somewhat injurious. The "chasia" disease has caused some injury. The plants have begun to fruit. The anna yield is not fully reported.

Kairâ.—Area 10,664 acres, that is, 1 per cent. above last year, and about 66 per cent. more than average. Kaira is not a cotton district. The largest area under cotton is in Anand, and the smallest in Kapadvanj, In Anand the season was not favourable. The rainfall was too light in the beginning and too heavy at the end of the season. There was also injury from frost and from cloudy weather. The yield varies from 3 to 9 annas. Estimated outturn is 1,150 bales.

Panch Mahals.—Area only 795 acres or about 200 acres more than last year. Nearly the whole of this area is in Halol. In Halol the crop is middling and is estimated at 8 annas.

KARNATAK

Dhârwar —Area about 487,880 acres, that is, 5 per cent. above last year and 25 per cent. above average Of this about two thirds is under indigenous or Kumta cotton, and the remaining one third under exotic or Dharwar-American cotton In the western talukas scarcely any is grown. The deficient rainfall in August retarded cotton-sowing in many parts The rainfall at the beginning of September was heavy in parts but fell off towards the close of the month, and on the whole was sufficient and favourable The season was, generally speaking, favourable, and this accounts for the increase in area over last year. The north-east wind in December and January brought on blight to the exotic cotton. The indigenous cotton is generally good, and nearly up to average. The average yield for the whole district is 9 annas for indigenous, and 5 annas for exotic Estimated outturn is 51,900 bales

Bijapoor.—Area about 410,600 acres or about 20 times that of last year and 55 per cent above average The area this year is unusually large everywhere owing to favourable rains. Cotton-sowing began with good rain about the middle of August, and was completed by the middle of October. There was some damage done by locusts and grasshoppers to early sown *jowari* ; and the deficiency of the July rainfall retarded re sowings of this crop in many places This and the favourable rainfall for cotton in August encouraged the cultivators to devote more land to cotton, both indigenous and exotic. The area under the latter is 33,000 acres. The crop was blighted everywhere owing to the north-east wind and cloudy weather. The yield is said to vary from 4 to 8 annas of indigenous cotton and 2 to 8 annas of exotic cotton. Estimated outturn is 29,010 bales.

Belgaum —Area about 189,700 acres, that is, about 51 per cent. more than the average and 32 per cent, above last year. The bulk of the cotton is what is known in Bombay as Kumta cotton. There are about 850 acres under exotic cotton or Dharwar-American, the July rain was deficient and the August rainfall (favourable for cotton-sowing) was most seasonable. The cotton plants were at first healthy and vigorous, but since they first began flowering, the north-east wind has set in and caused blight in parts. In the Belgaum taluka the yield is estimated at 12 annas, in other talukas it varies from 4 to 8 annas. The estimated outturn is 10,900 bales, of which about 10 are of exotic cotton. There has been as yet no trade in new cotton.

SIND

Hyderabad.—Area roughly estimated at 55,600 acres. or 3 per cent. below last year, but 30 per cent, above average. Injury from frost in January is reported from several talukas.

Shikarpore.—The area is 9,500 acres. Crop on the whole some what poor and below the average owing to insufficient water supply and rainfall Yield 10 annas.

Upper Sind Frontier.—Area 2,500 acres. Condition in the chief talukas poor and below average owing to damage done by boll-worms and excessive moisture.

Thar and Parkar.—Estimated figures are 3,500 acres. Crop good

Karachee.—Area 1,037 acres. Condition fair.

Khairpore.—Area about 2,800 acres. Crop in places poor. Yield is 9 annas.

GUZERAT STATES.

Baroda.—Area 400,000 acres, that is, 4 per cent. less than last year. The area figures for Native States are not more than approximately correct. Condition and prospects about the same as in the neighbouring British districts. The yield is reported to vary from 8 to 10 annas.

Kathiawar.—Area 1 675,000 acres, or 5 per cent. less than last year. The decrease is general and is due to excessive rainfall in the beginning of the season, which destroyed the crops newly sown, so that the land had to be re-sown with some other crop. Crop on the whole fair.

Cutch.—Area 187,000 acres or 2 per cent. less than last year. The decrease is due to rainfall being seasonable for other crops, Injury from frost is reported. The estimated yield is 10 annas.

Other Guzerat States.—106,672 acres or 21,125 acres less than last year. Frost reported from Cambay; yield 8 annas; in Mahikantha the crop is good ; yield 12 annas. In most of the Rewakantha States yield is from 4 to 8 annas.

SOUTHERN MARATHA STATES.

Kolhapore —Area 34,000 acres, that is, 14 per cent. more than last year In the first two the increase is due to timely rainfall Crop is in places blighted. Yield 12 annas in Kathkol and 5 annas in Kalbag

Other Southern Maharatta States.—Area 211,744 acres The crop has been blighted more or less everywhere.

A German Chemist has invented a new kind of anæsthetic bullet, which, he urges, will, if brought into general use, greatly diminish the horrors of war. The bullet is of a brittle substance, breaking directly when it comes in contact with the object at which it is aimed. It contains a powerful anæsthetic, producing instantaneously complete insensibility lasting for twelve hours, which, except that the action of the heart continues, is not to be distinguished from death A battle field where these bullets are used will in a short time be apparently covered with dead bodies, but in reality merely with the prostrate forms of soldiers reduced for the time being to a state of unconsciousness. While in this condition they may, the German chemist points out, be carefully packed in ambulance waggons and carried off as prisoners !

Miscellaneous Items.

THE net value of gold imported to this country from the beginning of the official year to the end of January was Rs. 1,35,84,360, and that of silver imported was Rs. 5,25,49 033, making the total net imports of the precious metals Rs. 6,61,33,393. The assay value of coins and bullion received in the Indian Mints during the same period was Rs. 3,70,74,270, and of the same coined and examined Rs. 3,91,74,170.

AT a meeting of the Caucasian Medical Society, Dr. A. P. Astvatzaturoff, of Tiflis, drew attention to the danger of infection arising from the promiscuous use of the mouthpieces of public telephones. To prevent any accident of the kind, he recommends that the mouthpieces should be disinfected every time after, or still better, before it is used. In other words, some disinfectant fluid should be kept at every telephone station; and the speaker should, first of all, dip the mouthpiece into the fluid, and then wipe it with a clean towel.

EVERYTHING has its uses, especially in agriculture. Even horns and hoofs can be utilized as fertilizers of the soil. According to an American exchange, the horns and hoofs make very valuable manure, but are usually worth more to the glue manufacturers than they are to the farmers for manure. However, where circumstances are such that they cannot be profitably disposed of, they can readily be reduced either by using acids which is the quickest method, or they can be put in a hogshead with first a layer of unleached wood ashes about three or four inches thick, then a layer of horns and hoofs then another layer of ashes and so on until the cask is full, completing the work with ashes on the top. Keep constantly moistened with water and the mass will soon be reduced. Hot, fermenting manure will serve the same purpose as ashes, though the process of reduction is not so quick. If manure is used make alternate layers in the barnyard of manure and horns and hoofs, keeping the pile moistened to prevent fire-hanging.

ACCORDING to the *American Agriculturist* seaweed or "wrack," as it is often called, is extensively used on the seacoast of Maine, and perhaps in other States of the Union, the effect of which is the production of an extra large crop of potatoes. But the objection to this fertilizer is that it gives the potato a "tangy taste" —the local term for a disagreeable taste. On the southern coast of England, and on the Channel Islands, France, opposite and other parts of Europe, seaweed is extensively used for growing potatoes, and we hear no complaint against their taste. Perhaps this may arise from a difference in the quality of the weed, or they may compost it with something to neutralize the disagreeable flavour it gives to the tubers. We have used seaweed for many years past composted in autumn with stable manure, laid up in beds to lie all winter. By spring it becomes well rotted, and on being tossed over made a fine, homogeneous mass. Perhaps guano, bone dust, superphosphate, or rich muck and lime might have the same effect: but unleached, or even leached, wood ashes certainly would, and these are the best possible fertilizers for potatoes grown in a moderately good soil, with little or no sand in it to be easily leached through. Use seaweed wherever it is obtainable.

THE manufacture of castor-oil in Russia, says an exchange, dates from a comparatively recent time, but has made such great strides that Russian consumers now depend largely, if not entirely, upon home industry, whereas, formerly all the castor oil consumed in that country was imported from England and France. It was not, however, until alizarine oil began to take the place of the Tourante oil in Turkey-red dyeing that the consumption of castor-oil, as the principal constituent of the alizarine oil, assumed important proportions in Russia. This necessitated the importation of from 3,000,000 lbs. to 5,400,000 lbs. per year from London and Marseilles until in the course of time it was discovered that all of this oil might just as well be produced at home. The first plant for expressing oil from the castor bean in Russia was established at Libau about four years ago, by Mr. Alfred Kieler. The latest official record places his production at 2,880,000 lbs. per year, but he did not long enjoy a monopoly of the industry, for two other works, with a capacity of 2,160 000 lbs and 720,000 lbs. were started near Moscow, and lately an oil factory at Odessa, and another in Poland, have taken up the production of castor-oil, although on a smaller scale. Thus, even with so large a consumption as 5,400,000 lbs., the Turkey-red dyers of Russia are not likely to be short of castor-oil, and there are unmistakable signs that the production is in excess of requirements, as the prices realised on castor oil in Russia have all but ceased to be remunerative.

ON the subject of wind-galls, the same paper says:—"Small round swellings, appearing on the sides of the tendons of the foot, are familiarly known as wind galls or puffs. Their origin is sometimes obscure, though generally they can be traced to some sprain or severe over-exertion. The affection is merely local, and consists in an inflammation of the small sac or *bursa*, interposed at all points where tendons play over prominent bony points. The sac becomes distended by fluid poured out during the acute inflammation. This may become hard or gradually re-absorbed again: usually, however, it remains in a fluid state, varying in its density in different cases. Simple wind-galls may often be made to disappear by continuous pressure made upon them. This is readily effected by placing a small pad over the swelling, and bandaging it in position. The pressure should be exerted for one or two hours twice a day the first day, and increase the same length of time each succeeding day, until the dressing can be left in place all the time. Should any signs of inflammation occur, the bandage must at once be removed. This method is tedious and may require a month or two to effect a cure. Another method recommended by some veterinarians is to draw off the fluid by means of a hypodermic syringe and then inject into the sac a weak solution of iodine or carbolic acid, in the proportion of one part acid to five parts of water. Where the puffs are of recent origin, counter-irritation by means of iodine, or astringents, as a saturated solution of alum, applied externally has frequently succeeded in causing them to disappear.

THE attention of the United Kingdom Alliance and other teetotal societies may well be drawn to a very temperate pamphlet lately published by Mr. J. Thomann, of New York, who has set himself the task of investigating the effects of beer drinking in health. Mr. Thomann gives more than the results of his own researches, he quotes other authorities, and the outcome of his inquiries is to show that—to quote the words of a distinguished French physician—"beer is very healthy beverage; it helps digestion, quenches thirst, and furnishes an amount of assimilable substance much greater than that contained in any other beverage." The investigation shows that the death-rate among men employed in breweries is lower by 40 per cent than that amongst other men; that the health of brewers is exceptionally good, particularly as regards absence of kidney and liver diseases; and that they live longer, and retain their physical energies better, than their even fellows who are not connected with the manufacture or distribution of beer. That brewers drink more beer, and drink it more constantly than any other class is rather in the nature of assertion and hard of proof; nevertheless Mr. Thomann gives his reasons for the statements he makes. Workmen in American breweries are allowed to drink just what they like, and the average daily consumption is about ten pints; many drink about twice as much; and a couple of men are said to drink—taking one day with another—not less than seventy glasses—that is, nearly thirty pints. It is not by any means suggested that this quantity can be wholesome, but if a few exceed due limits the general average of health and longevity appears the more remarkable. It may be doubted whether any body of teetotallers could produce such satisfactory figures as those put forth in Mr. Thomann's phamphlet concerning beer drinkers.

SOME things, says the *American Agriculturist*, are so common that they do not strike us as wonderful. But what can be more wonderful than the change of a repulsive caterpillar into a beautifully formed and brightly colored butterfly? If there were but a single insect that made these changes, how we should hunt for the caterpillars, feed them until full grown and formed a chrysalis. Then we should preserve the chrysalis with great care until the next spring. As the time approached for the perfect insect to leave its prison how carefully would the chrysalis be watched and at the first sign of breaking open, we should call in our friends to enjoy with us this return to life, this wonderful resurrection, when the loathsome caterpillar, having put on the bright garments of the butterfly, and when its wings are dry, goes sailing forth in the bright sunshine to bask among the flowers. But there are caterpillars in myriads, and as this change is going on so frequently, it fails to excite our special interest. Not only do butterflies live two such different lives as that of caterpillar and the perfect insect, but other insects show changes quite as striking. What can be more unlike than the little "wriggler," as it goes turning its somersaults through the water, and the delicately formed mosquito that sings around our pillow in the summer night? Other animals besides insects present at different periods of their lives very unlike forms. The common crab of our sea coast, for example, when it leaves the egg, is a strange looking creature. This goes swimming about very rapidly, and was at one time described as a distinct animal, its relationship to the crab not being suspected. After a while this zoea, as it has been called, drops some of its parts, acquires legs, claws, &c., and becomes a perfect crab. These changes and many others are quite as striking as any story told in the wonder books. If you learn to notice them, life need never be dull. Nowhere are the wonders of nature better studied than on the farm. Every country has its interesting object and none more so than our our own.

Selections.

BREAD CHEMICALLY CONSIDERED.

The two principal products of wheat flower is leavened and unleavened, the first of which is the ordinary loaf bread. The yeast added causes the sugar contained in the flour to undergo what we term vinous fermentation, as a result of which carbonic acid gas and alcohol are formed. It is not at all improbable that the fermentation is prompted by the starch—a proportion of which may perhaps yield an additional quantity of sugar. The carbonic acid is held in the combination by the adhering property of the dough, which swells up by the action of this gas acquiring a vesicular texture forming a spongy mass. In this way, therefore, are produced the vesicles or eyes which give to ordinary loaf bread its lightness and elasticity. In well baked bread those vesicles are stratified in layers which are perpendicular to the crust, forming thus what the housewife terms piled or flaky bread. The tenacity of the dough, upon which the vesicular structure depends is owing to the gluten which it contains.

When the bread comes from the oven sour, it is caused by the vinous fermentation not being checked and both acetic and lactic acid is generated.

If we take a loaf of bread hot from an air-tight oven and weigh the same we shall find it much heavier than the weight of all the ingredients entering into its structure by at least thirty per cent. In the formation of bread more than one-fourth of the moisture is taken up by the flour; and if oat or barley meal be used still greater increase follows. The gluten in wheat being much larger than in other grain, explains the seeming paradox, which also renders wheat bread *more digestible than other species of bread.* When sodium is used it performs no office save to flavor and to give stiffness to the dough.

By consulting an attorney we found that on the State statutes there appears a law prohibiting the use of alum by bakers, but in three samples of bread, subjected to the necessary chemical test, we find it present. It augments the whiteness of the bread, also its firmness of bread made of the inferior kinds of flour, and, by the latter effect, renders the bread less liable to crumble when cut, while it enables the baker to separate the loaves more readily when removed from the oven.

Whatever doubts may exist among scientists as to the ill effects of alum when taken into the stomach, none can exist as to its positive pernicious influence in cases of dyspepsia. Bread containing alum is objectionable, not merely on account of its containing salt, but because it is generally made from inferior flour, the firm article not needing its addition as the same results precisely are reached without it.

Potatoes are very commonly used in bread-making. They assist fermentation in the manufacture of bread, and render the mass lighter. As they contain less gluten, they are, of course, less nutritive than flour; but in no other case is their use objectionable and there is nothing to prevent public bakers from using them. We made some bread in the laboratory the other day of best wheat flour, distilled water, and yeast, using no salt, and a very good quality was the apparent result. When the bread had become cool in a vacuum it was subjected to the usual chemical test, and one hundred parts found to contain the following constituted elements:

Starch ...	55 [illegible]
Torrefied or gummy starch	18 0
Sugar	3 6
Gluten .	20 7[illegible]
Starch — — ..	trace.
Loss by cooking ...	1 15
	100 00

Of course this cooking process or loss contains gas but at the same time tests were not made for chloride of calcium and chloride of magnesia. Hence it would appear from this that part of the starch is converted into dextrine by the process of panification.

Moreover, as the quantity of sugar in the baked loaf is nearly equal to that of the flour, it is probable that a portion of the saccharine matter is formed at the expense of the starch.—*Southern Trade Gazette.*

NITRATE OF SODA: ITS USE AND ABUSE.

By Camduslang.

Of the three principal manurial ingredients which add to the fertility of land, *viz.* nitric acid, in an active or inactive state), phosphoric acid, and potash, nitric acid is by far the most important. Either of these three individual substances become of very great importance in any case where by a certain course of cropping, intensified by a natural limited supply of either of these substances, they become in great part exhausted. Absolute exhaustion is out of the question, and even comparative exhaustion is farther distant than most people, not intimately acquainted with manures and cropping are aware. Exhaustion, in the ordinary sense of the word, as applied to our ordinary arable land, means, in the majority of cases nothing more or less than a want of nitric acid, as, fortunately, most soils contain an abundant supply of potash, and a great many a fair amount of phosphoric acid. If a deficiency of any of these exist, as a general rule it will be found that sandy soils are more benefited by potash than those of a clayey nature; while clay soils may or may not be benefited by manurings of phosphoric acid, according to the natural formation of it and the course of cropping to which it has been subjected. The soil can only be deprived of those substances by cropping, whereas an enormous amount of nitric acid is annually lost to the soil of all countries having anything like a moderate rainfall, by being carried away by the drainage water to the rivers and sea, or so far carried down into the subsoil as to be outside of the reach of ordinary farm crops. The virgin prairie lands of America, the black soils of India and Russia all owe their great fertility to the large stock of nitric acid which they contain in one or other of its many combinations.

Wherever land is deprived by cropping to any great extent of its available supply of nitric acid, it becomes almost sterile, as the Eastern States of America only too plainly bear witness at the present day. This is very clearly pointed out in the mineral manured plots of the different experimental stations throughout the world, and particularly so at Rothamsted in England, where ample applications of phosphoric acid and potash, used annually for forty years, give a return little over similar land continuously cropped and unmanured, while contiguous plots of the same land, manured with the same minerals and a moderate quantity of nitrate of soda, yield the largest crop which the land and season are capable of producing.

The followers of Liebig and Ville believe that some classes of crops are capable of extracting all or the greater portion of their nitric acid from the air, but this theory does not admit of either direct or indirect proof, in fact, the bulk of the evidence goes to prove that plants take up the whole or greater portion of their nitrogen from the soil only, and through the roots and not by the leaves from the air. The point is the most debatable one in the whole science of manuring, and a great deal can be said for both views, so that I think it will ultimately be proved that a few plants may be capable of extracting a portion of their nitrogen from the air, although all plants are not capable of doing so. It is a pity but that the point could be satisfactorily cleared up for as long as we have one set of agricultural teachers promulgating one theory, and another the very reverse, one need not wonder at the confused ideas of many farmers and manure manufacturers regarding the food and manuring of plants.

HOW NITRIC ACID ACCUMULATES.

The store of nitric acid in the soil appears to have in great part been originally derived during successive ages from the rainfall, and probably by direct absorption from the atmosphere. This result may be seen in direct progress by visiting any sea girt rock, sufficiently distant from land to be comparatively free from dust, and high enough not to be washed by the sea. There on the ledges of the rocks will be found very small portions of fine sand, forced from the face of the overhanging cliffs by the action of the forests of previous winters, combined with the weathering action of the atmosphere, and washed down on to all projections by the rain. In comparatively humid climates the only plants which are capable of finding a precarious existence will for a very long time be confined to those of the moss and lichen class. Even these are not capable of continuous existence, but may be killed off every season now and again by drought, their remains being left to furnish food and roothold for the same or any other species which may be capable of living under such adverse circumstances, for in many cases it will be found that large numbers of these plants have little or no roothold other than what the rough surface of the rock affords. These low growing plants are generally capable of existing with a very small supply of nitric acid, and the decaying rock yields as much phosphoric acid and potash as supplies their wants. The rainfall always yields a small amount of nitric acid, which, being much needed for, their existence is at once greedily taken up by them. The amount so yielded by the rainfall throughout European rural districts is generally estimated at from 5lbs. to 5½ lbs of nitrogen per Imperial acre, which is equal to about 40 lbs of nitrate of soda over the same area. In the vicinity of, or in the course of aerial currents coming from large towns or manufacturing centres, it may be double that, owing to the soot and other impurities which the air may contain. In fact it has been calculated that a firm of Scotch ironmasters have for a lifetime been blowing into the air nitrogen equal to half a million of pounds sterling per annum.

The low growing forms of vegetation live and die through successive generations, all the while yielding up their substance to be fed on by succeeding occupants, the store of nitrogen in the miniature soil all the while increasing as the size of the plants increase and as each generation of plants adds its mite of accumulated nitrogen to the general store, the foothold and food supply of an improved order of plants gradually increases until grasses, shrubs and trees find a home and sufficient food for their support. Under such conditions little or no nitrogen is lost or removed, as all blades and leaves are returned to the soil, as it must now be called. This is the reason why such stores of nitrogen are accumulated in our permanent pastures and unbroken prairies, and which in later ages will yield up large quantities of plant food for the growth of our cultivated crops.

Nitrogen, therefore, being of such immense importance in plant and life, its production in sufficient quantity in a state available for plant food, and at a reasonable cost, has been the aim of all agricultural experimenters and chemists since these facts became known. Nitrate of soda was early fixed on as one of the readiest available substances for this purpose, and the opinion formed of it then has been more than borne out by the experience of future years, until at the present time it is the foremost manurial substance in existence.

HISTORY.

The earliest use of nitrate of soda as a manure does not extend to much over thirty years back, and at that time its use was restricted to the merest quantities. It is principally within the last twenty years that it has come into anything like general use, and with a few ups and downs, caused by excessive high or low prices, its use has within that time been gradually on the increase.

The total exports of nitrate of soda from Peru in 1855 are given in the official tables as 42 000 tons, while ten years later Great Britain alone used 40,090 tons out of a total production of 106 000 tons, the bulk of the remainder going to Germany and France. Other ten years later, or in 1875, the total production reached 327,000 tons of which the United Kingdom took 107,000 tons, France 59,000 tons, and Germany 52,000 tons. The average of the production of 1883, and 1884 from peru Bolivia, and Chili, was 555,000 tons, of which an average alone of 383 300 tons went to the Continent, 103 700 tons to Great Britain, while America received about 55,000 tons annually. Of the 383,300 tons which went to the Continent during these years, Hamburgh alone received an average of 220,000 tons, and the French ports an annual average of 83,000 tons among them. It will thus be seen that the largest users of nitrate are not always the same nations, for in 1865 we find Britain used 40,000 tons out of a total production of 106,000 tons; in 1875 Britain used a half of the total produce and France 7,000 tons more than Germany; while in 1883 and 1884 Britain did not use one-fifth of the total output, and Hamburgh alone received nearly three times as much as all the French ports together, and more than the double of Britain, America getting about the half.

The exports of nitrate of soda from Peru, Bolivia, and Chili for thirty years, from 1855 to 1884, were :—

	Tons.		Tons.
1855	42,000	1870	128,000
1856	37,000	1871	150 000
1857	48,000	1872	102 000
1858	53,000	1873	275 000
1859	68,000	1874	253 000
1860	60,000	1875	327 000
1861	59,000	1876	320,000
1862	71,000	1877	225,000
1863	66 000	1878	323 000
1864	48 000	1879	155,000
1865	106,000	1880	220,000
1866	95 000	1881	350 000
1867	101 000	1882	486,000
1868	83 000	1883	570,000
1869	109,000	1884	540,000

It will thus be seen that in thirty years the production of nitrate of soda has increased about fourteen-fold, or from 42,000 tons to 540,000 tons per annum.

QUANTITY AND VALUE.

It is difficult to estimate with any degree of certainty the exact amount of nitrate of soda which has been annually used in agriculture, but from the best information at my disposal I have estimated that in 1865, about 7,000 tons, or about one-fifth of the total imports into the United Kingdom, were used for agricultural purposes. In 1875 the Peruvian Government agents in Britain estimated from their sales to their different classes of purchasers, that about 82,300 tons or one-half of the total British imports were used in agriculture; while, at the present time, I estimate that in Great Britain the quantity used on the land is at least not less than it was in 1875, and probably considerably more, notwithstanding the large quantities of sulphate of ammonia and other nitrogenous manures; which have in recent years been added to our stock of fertilisers, and the lower value which agricultural produce has of late years been realising. As the imports of nitrate of soda for the last three years have averaged for the United Kingdom 104,000 tons, it thus follows that four-fifths of the present imports are used in farming. The use of 70 000 or 80 000 tons of nitrate of soda as an annual dressing on the lands of such a small country as Great Britain, or if we more properly consider the arable portion of it, which is even smaller, must be an immense increase to the food production of that country. Allowing 16 lbs. of nitrogen to each cwt, of nitrate of soda, we get 320lbs, of nitrogen per ton, which multiplied by 80,000 the number of tons used, gives 25,000,000lbs., of nitrogen from nitrate of soda, as the annual manuring of the lands of the United Kingdom. Now, a bushel of wheat, roughly speaking contains 1lb, of nitrogen, we therefore have 25,000,000 bushels of what as being an equivalent of the nitrate of soda annually used in Great Britain, if all was turned into wheat, and all the manure applied was recoverable in the crop. This quantity of wheat is just about one-eighth of the total bread products (home and foreign) used in Britain, so that nitrate of soda acts as a far more powerful factor in wielding the destinies of Great Britain than is generally supposed. Although a considerable portion of the nitrate of soda applied to land is never recovered in the crop, and all the nitrate of soda used is not turned directly into wheat, yet by being used in the production of fodder crops for animals or vegetable crops for man, its use is equally as much adding to, the food of the people as if it were all applied direct to the growth of wheat.—*North British Agriculturist.*

FODDER AND FEEDING.

By Dr. A. P. Aitken.

The nutritive constituents of fodder—the albuminoids, fat carbo hydrates, and mineral salts—are subjected in the stomach and intestines to a series of mechanical and chemical changes, which render them more soluble and more capable of soaking through the thin membranous walls of the absorbing cells which line these organs and eventually they pass into the blood. Analysis the blood of various animals in various circumstances show that the composition of the blood is liable to very little variation. However much the food may vary; however watery and dry it may be; however small or large may be the quantity eaten; or however much the relative proportion of the food constituents may vary, the blood remains almost constant in its character. This uniformity is one of the most striking facts in animal physiology. The substances which pass into the blood from the alimentary canal have a very different composition from that of the blood itself; they consist chiefly of carbohydrates, that is to say, sugar, a kind of sugar similar to that found in grapes and many other fruits and known by the name of *grape sugar*. The quantity of this substance, or of other carbohydrates capable of being converted into it that an ox digests in a day amounts to about fifteen pounds weight and this is all received into the blood; is analysed at any time only a mere trace of it is able to be detected. There is no place in the animal body, as their is in plants, where sugar is stored up so that all that enormous quantity of sugary matter which is daily received by the blood must be converted into something else.

If a piece of sugar is thrown into the fire it blazes away brilliantly until it is entirely burnt leaving no ash nor vestige of any kind Remembering what the composition of sugar is, *viz*, carbon and the elements of water we are quite prepared to find that the change which has happened to the sugar during combustion is that the carbon has been oxidised and converted into carbonic acid gas, and the water has been set free. When sugar is put into the blood of a living animal it ultimately undergoes the very same change. It is burned by the oxygen contained in the blood, just as completely as if it had been set fire to in oxygen gas or in air; the chief difference being that whereas in the one case it is burned with great rapidity at a high temperature, giving forth light as well as heat, in the other it is burned very slowly at a low temperature, namely, the temperature of the body, but in the end it gives out exactly the same amount of heat. The total amount of heat given out by a pound of carbon is always the same, whether it is burned quickly or slowly; and same amount of oxygen required to burn it in the one way as in the other.

The oxygen which burns the sugar put daily into the blood of an ox is derived from the air; it is absorbed from the air by the blood as it passes through the lungs, and it is supplied to the lungs in the act of breathing. At the same time that the oxygen is being absorbed, carbonic acid is being exhaled and the amount of carbonic acid exhaled has been carefully measured and forms a rough index of the amount of combustion of carbon that is taking place in the animal's body. A certain amount of carbonic acid escapes by the skin and otherwise, but the great mass of it is breathed out from the lungs. In a full grown ox it is found that enough of carbonic acid is exhaled daily to account for the combustion of about six pounds of carbon which is at the rate of about a quarter of a pound per hour, or about 30 grains per minute. Considering the great bulk of the body of the ox, and that the combustion is taking place not in the lungs only, but in all parts of the body, the temperature at which the combustion is carried on does not exceed that which is known as blood heat The temperature of the body is not maintained by the combustion of the carbon alone that is contained in the food, for a small amount of hydrogen is also being burned, forming water vapour; but as by far the greater part or the animal heat is derived from the combustion of carbon, it is sufficient in the meatime to refer to it alone.

As has been said, the great bulk of the food eaten by an ox or other farm animal, consists of carbo-hydrates capable of conversion into grape sugar, and when we consider that more than a fourth of grape sugar consists of carbon, we see that the carbohydrates in the animal food have a most important office to perform in maintaining the temperature of the body. It is on that account that they are frequently described as *heat producers*, and as heat is capable of being converted into work of various kinds, they are sometimes called *force producers*. These are very appropriate names but when used too absolutely, they are apt to give rise to misconception for there are other constituents of food which pewerfully assist in maintainong animal heat. Carnivorous animals eat no carbohydrates, and yet maintain their bodies at a high temparature, They obtain their heat from the combustion in their bodies of fat, which, weight for weight, is a more powerful fuel than carbohydrates. Fat contains more carbon than sugar, and it also contains a relative large proportion of hydrogen, which, when burned, gives out far more heat than does carbon. The food of farm animals always contains a small proportion of fat, and in the case of fattening animals the amount is greatly increased by the addition to their daily ration of a certain amount of oil or of oil-cake. Fat is a much more stable substance than sugar; that is to say, it is not so easily burned; and as it is capable of being stored up in the animal body, it may altogether escape combustion if a sufficient amount of carbohydrates is eaten to maintain the heat of the body. It is probable that the fat eaten in fodder is not directly burned in the blood, but that it must first break down in such a way as to produce grape sugar before it is consumed by the oxyen taken into the blood during respiration. No constituent of food is so easily burned in the blood as grape sugar, and hence it is frequently known by another name, *viz*, *respiratory food*, as so long as that name is used simply to express the ease with which it is burned during the process of respiration, no great objection need be taken to it.

Not only do carbohydrates and fat provide grape sugar for combustion in the blood, but albuminoids by their constant decomposition are a continual source of that substance. The animal waste which is inseparable from animal life is characterised by the breaking down of albuminoid matter, and that is a process which goes on day and night quite irrespective of whether the body is at work or at rest. The causes and conditions of this inevitable waste are but imperfectly understood, but is is well-known that the breaking down of albuminoid matter is attended with the production of a nitrogenous substance called urea, which is taken up by, or formed in, the blood, and which is separated from the blood by means of the kidneys, and discharged from the body in the urine. It is entirely derived from the albumen of the body; and it is

evident from its composition, that when it is abstracted from albumen the substance that remains is not very far removed from fat in its composition. Moreover, it has been abundantly proved that that residue is capable of being converted into fat, and that the fat so produced is much more easily broken down and converted into grape sugar, and burned in the blood, than is the fat contained ready made in fodder. We shall refer to this more carefully when considering the laws of fat and flesh production.

In the former chapter it was shown that in order to enable an animal to make flesh it must be supplied with an amount of albuminoid matter in its food more than sufficient to repair the daily loss of that substance, to which all animals are subject at every moment of their lives. When an animal gets no food the daily loss of albumen is reduced to a minimum, but it goes on unceasingly, so that after a few days or weeks, according to the kind of animal, and according to the bodily condition it was in before fasting began, it dies. It has been noticed that after the first day or two the amount of flesh waste of a fasting animal remains at a uniform low level for some time, but that a sudden increase takes place during the last few days, and it had been found that at the time the increase occurs the animal has consumed its store of fat. The conclusion drawn from that circumstance is that so long as the animal had any fat left its presence prevented to some extent the albumen or flesh of its body from wasting. This is an additional proof of what was mentioned before, namely, that fat in the body diminishes though it cannot altogether prevent the nitrogenous or albuminoid waste of the body. If a fasting animal has arrived at the stage when it has parted with its fat, and if we then feed it with albuminoid food in sufficient quantity, it will gradually gain weight. The albumen of its food will more than balance the albuminoid waste, and by and by it will attain its former weight and get back its fat as well as its flesh. It is thus seen that fat is able to be formed in the body, even though the animal has been fed on flesh from which all fat had previously been extracted. Only a small fraction of the albumen of the food when digested and absorbed into the animals circulation is able to be retained in the body and form part of its muscular or other albuminoid tissue the rest of it is broken down, and is expelled from the body as urea or other nitrogenous waste in the urine. But after the urea has been formed, they still remains a non-nitrogenous residue, which is capable of forming fat to the extent of half the weight of the albumen from which it is derived. The fat thus formed may either be burned in the blood and produced animal heat and energy, or it may be stored up in the animal's tissues. The amount of albumen which a carnivorous animal, such as a dog, eats is far more than sufficient to account for all the fat in its body, and even herbivorous animals such as oxen and sheep, may consume in their ordinary food an amount of albuminoid matter more than enough to provide them with the relatively large amount of fat that they accumulate. In Germany, where a large number of experiments were made, especially by Pettenkofer and Voit, to discover how fat was formed in the body, this fact was so striking that it led to the belief that the albuminoid matter in the food was the chief source of fat. The only other source of fat that seemed available was the fat contained ready made in the food itself, and it was easily proved that fat eaten as food was directly absorbed into the body, but the amount of fat contained in the food of herbivorous animals is so small that it could not account for more than a small part of fat found in the carcass. The animal that formed the chief subject for experiment was the dog as sheep and oxen were not so easily managed in the apparatus used in making the investigation, and it was owing to this circumstance that the German investigators failed to discover another very important source of animal fat. Many years ago Lawes and Gilbert made a series of experiments on this subject on a very large scale, and they went about it in a very practical way. They chose the pig as the subject for experiment, as it was the animal which by nature had the greatest tendency to fatten. They fed pigs in various ways. Some received a diet containing a large proportion of albuminoid matter, such as bean meal and linseed meal; and others received a diet of Indian corn or of barley meal, which are relatively poor in albuminoid matter and fat, but which contain a large proportion of starch. They discovered the chemical composition of some of the pigs by analysing the carcass before the experiment began; they then fed the others until they were fat, and then slaughtered them and analysed their carcass. They thus got a fairly accurate knowledge of the difference between the fat and lean carcass, and could say how much fat had been formed from the food they had eaten. On comparing the amount of fat produced with the amount of albuminoid matter and fat consumed as food, they found that in the case of those pigs that had been fed on Indian corn and barley meal, the amount of fat was far in excess of what could have been formed from the albumen and fat they had eaten, and they concluded that it had been derived from the starch and other carbohydrates of the food. Since then a number of experiments have been tried on the Continent with pigs fed on barley meal, rice, and other similar foods, and the results have corroborated those obtained at Rothamsted.

Not only as regards pigs, but also in the case of sheep and other herbivorous animals, carefully planned experiments have shown that fat is formed in their bodies from the carbohydrates of their food, and still more recent experiments have shown that carnivorous animals may derive their fat from starch or sugar given as food. It is only natural to suppose that the process of assimilation and fat formation which is found in the pig should also be found in other animals, which however much they may differ in habits and confirmation absorb from their food of whatever kind it is the same substances albumen fat and sugar; and the processes these are subjected to in the organs of the body which have similar functions to perform in all animals cannot be very different.

There are thus three sources of fat in the animal body. First, the fat ready made in the food; second the residue from the breaking down of albuminoid matter; and third the carbohydrates. The most stable of these forms is the fat contained in the food, and it is therefore most easily stored up as fat in the tissues. When fat has been laid up in the tissues, it is not liable to be decomposed so long as there is sufficient albuminoid food eaten to provide fat that is more easily burned in the blood before it has had time to be organised, and again the fat formed from albumen is less liable to be burned and more likely to be stored up as fat in the tissues, if there is a sufficient supply of carbohydrates to supply the wants of the respiratory process. If the supply of carbohydrates is in excess of that quantity, it is able to be converted into fat and in that form it is secure against decomposition so long as the supply of albuminoids and carbohydrates in the food is maintained. If the supply of food is not maintained, or if the animal looses appetite the carbohydrates are all consumed in the blood and the fatty matter from the decomposing albumen is also burned, and if that is not sufficient to support the animal's respiration the organised fat is taken back into the blood and burned. Whatever increases the respiratory process prevents the formation of fat or, it may be, uses up the fat of the body. Too much drinking of water, or indulgence in too watery a diet increases the amount of tissue waste and prevents the laying on of fat. Two low a temperature is detrimental, for in that cause more carbon is burned in the blood to maintain the heat of the body; too high a temperature is also injurious because it causes the animal to sweat, and in perspiring it looses fat. About 65 degs. Fahr. is a convenient temperature if it is much higher than that the animal becomes restless and looses appetite.

Too much motion is also unfavourable to fattening, because of the increased respiration it induces.

For the making of fat as for the making of flesh, it is necessary that a proper proportion should exist between the albuminoids and the carbohydrates of the food. What is called the nutrient ratio—the ratio of albuminoids to carbohydrates—requires to be considered, and for each stage of an animal's progress there is a ratio that is more suitable and more economical than others. If the albuminoids are given too abundantly the amount of carbohydrate is not sufficient to protect it from waste, and it is lost in the urine; if too much carbohydrates are used, they escape digestion, and are lost in the solid excrement. We are far from being able to give an exact rule for the adjustment of the ratio to the various conditions of animal feeding, so that no undue waste either way takes place; but there are some facts and principles to guide us in selecting the kind and quantity of food most favourable for various purposes, and these will be described after we have examined the chief kinds of fodder and seen how to estimate their relative importance.—*North British Agriculturist.*

KAURI RESIN.

The following paper was read by Mr. Gellatly, Curator of the Edinburgh Museum of Science, on January 13th, at the last meeting of the Edinburgh Botanical Society:—

The Dammara australis which yields the Kauri resin is the largest of the New Zealand trees. It is confined to the northern portion of the North Island, and grows on all soils up to the height of 1,500 feet, but is said to prefer the dry and sterile clays of the hilly districts. It reaches a height varying from 100 to 140 feet—some few growing as high as 170 feet or rather more. The tree is usually bare of branches for about 50 feet from the ground. A trunk has been occasionally but rarely seen as much as 35 feet in circumference. Laslett saw two exceptionally large trees—one at Wangaroa (a little to the northward of the Islands), that measured 48 feet in circumference at 3 feet from the ground, and another near Mercury Bay, which was 72 feet in circumference and 80 feet to the branches. As the tree, which is of slow growth, does not add more than an inch to its diameter in six or seven years, Mr. Laslett computed the ages of these two giants to be respectively about 1,300 and 2,000 years.

The timber is so useful that it is employed in the construction of most of the houses and for nearly all the boats in the North Island. There is a little difference of opinion about its quality. Mr. Laslett says that the timber is generally sound and free from defects common to many other descriptions of wood; that it shrinks very little and stands well after seasoning. Further, that it is remarkably solid, and may be considered one of the best woods for working that the carpenter can take in hand. Some of the colonists, however, state that it has a strong tendency to shrink and contract in length as well as in breadth, and that it often does this when freshly planed, no matter how well it is seasoned. It seems, however, to be unrivalled for the masts and spars of ships possessing the requisite dimensions, lightness elasticity and strength; and being more durable than any other Pine. Its specific gravity averages about ·530, somewhat less than the density of the timber of *Pinus sylvestris* brought from the Baltic ports.

The so-called Kauri gum—really a resin—exudes spontaneously from every part of the tree, and hardens upon the surface by exposure to the air, immense masses of the resin being often seen on old trees, suspended from the stem at the forked part of the branches. It is believed that the bark, branches, stumps, roots, and even the leaves of the Kauri Pine would yield a large amount of resin under proper management. When an incision is made in the bark of the Kaur tree the resin exudes freely, so that here, in the course of a few weeks, a large mass, of half dried resin will have accumulated. This new gum takes about three months to harden properly.

All except a very small portion of the Kauri resin so largely exported from New Zealand is, however, dug out of the ground in a fossil or semi-fossil state, but there is not much of it found more than 10 inches below the surface; that it occurs in the present

soil Occasionally it is found at a depth of 3 feet, and it is fished up in bogs or swamps, as well as dug out of dry ground. The resin is found either in small detached lumps, or in considerable quantities deposited in one hole. When dug up its surface is found to be partially decayed, and this portion requires to be scraped off. It is curious that where the buried gum is obtained there are now no remains of Kauri trees except the resin itself. Nevertheless, it is believed that forests of this Pine must have formerly grown over the areas where it is found.

The only tools used in procuring the resin are a spear and a spade. The spear is a pointed steel rod, with which the digger pierces the ground and by this means, after he becomes sufficiently expert, he can tell whether he is touching a stone or a piece of resin. If the latter, it is dug up with his spade. Between 1,000 and 2,000 Maories are usually engaged in digging for the resin, but although from habit and local experience they are more adroit at obtaining it than the settlers, they are said not to care for the work, and only continue at it when pressed by want. Many Europeans are also engaged ; these, however, are chiefly men impatient of regular occupation—vagabonds, dare-devils, or persons fond of a gipsy life. I see that an American Consul, in a report to his State Department points out with manifest glee, that amongst this nomadic class are a number of the degenerated sons of the aristocracy of Great Britain.

A few years ago an industrious man could dig out about 2 cwt per day ; now he will hardly obtain one-third of that quantity in the same time. The total annual yield is, however, not yet falling off, owing to the additional number of diggers employed. This quantity is very large for a substance of this kind, amounting to fully 5,000 tons, of which 3,000 are sent to America, and 2 000 to England. The average value of the fossil resin is now about £60 per ton. There are several qualities of it, however, varying in price from £45 to £170 according to its purity. The resin obtained from growing trees of which, as already remarked, very little has yet been exported—is not worth more than £25 per ton.

Although many specimens of Kauri resin are as beautiful as amber the Maories, notwithstanding that they have the artistic faculty in a high degree, do not appear to have ever applied the resin to any way as an ornament. As we see by objects handed down to us amber for this purpose must have been highly prized by the ancient Greeks, the Romans, the Vikings or Norsemen, and the early Celts. They only uses the Maories have made of Kauri resin have been to kindle fires and as a masticatory. In recent years lockets, brooches, and other small ornaments have been made of it by settlers at Auckland and other places in the North Island. They have the serious drawback of being not nearly so hard as amber ornaments.

The important uses of Kauri resin are—first, in the making of varnishes ; second, in the manufacture of linoleum—a floorcloth now largely made—in which this resin is advantageously mixed with common resin and oxidised linseed-oil ; and, third, in the dressing of silk fabrics [It is also used by dentists for taking moulds or casts.—Ed.]

Unfortunately it is yearly becoming more difficult to keep up the supply of this highly useful vegetable product. The resin first appeared in any quantity as an article of export from New Zealand about the year 1850. Mr. Reynolds of Auckland, who has been engaged in collecting it for export for twenty years, estimates that the fossil Kauri resin will be completely exhausted in twenty years hence. Probably in the meantime the discovery quantity of some equally valuable resin in another part of the world may render this calculation to some extent inaccurate, but according to several authorities the supply cannot last much longer.

The recent gum is not so serviceable as the fossil kind, owing to its softness, though it has a more pleasant odour when heated. But neither can a long continued supply of the new resin be hoped for. I hear from persons acquainted with the country, and I also see by remarks in papers published in the *Transactions of the New Zealand Institute*, that the existing forests of the Kauri Pine itself will more than likely be wholly cut down in another fifty years.

THE NATURAL HISTORY OF AFGHANISTAN.

A paper of unusual interest was read at the Linnean Society last night by D. J. E. T. Aitchison, who accompanied as naturalist, the Afghan Delimitation Commission. Dr. Aitchison has been able to bring together a great amount of new information not only on the natural history of Afghanistan, but also on its geographical and social conditions. We can only, however, refer to a few of the more generally interesting points which he brought before the Linnean Society last night. His botanical collections include 800 species, and about 10,000 specimens. Of these about 100 species are probably new to science. He has besides been able to accumulate much interesting information relative to economic products. Last night Dr Aitchison confined himself to drawing attention to some of the more salient features of the flora of North-Western Afghanistan, describing in greater detail the vegetation of the Heri-rud Valley and of the Badghis district. With the existing climatic conditions the result is except under the ameliorating influence of a river that cultivation under an altitude of 3,500 ft is impossible without the aid of irrigation: and until the dew line is gained, Afghanistan is a land totally devoid of trees or even shrubs. But as soon as this point is reached pistacia vera, juniperus excelsa, and a lonicera appear as forest trees, and wheat and barley no longer need irrigation Dr. Aitchison's collections do not quite represent what is generally recognised as the Oriental flora, being chiefly comprised of North Persian and Mediterranean, with a very few South Persian and Arabian forms, augmented by Central Asian and Siberian types, a few Western Hymalayan Tibetan, and a very limited number from the Punjab and Scinde regions. The purely local flora comprises in all probability one-sixth of the whole collection. The tropical zone spoken of by Hooker and Tomson as skirting the Afghan region does not extend to the north-west owing to the excessive fall in the winter temperature and the shortened summer, a conclusive proof of which is the absence of the date palm. Out of 75 natural orders, Compositæ and Leguminosæ greatly preponderate over the others, as might have been expected, containing 81 and 80 species respectively. Dr. Aitchison had little opportunity afforded him for investigating the Alpine flora of the country, as he was seldom able to collect in localities above 5,000 ft. in altitude ; above this height in exposed positions he found that trees and shrubs had disappeared. The portion of the valley of that part of the Heri rud river with which Dr. Aitchison is acquainted lies between the village of Shekewan in the south east to a little further north than Kamani-besht in the west. The general appearance of the valley in winter, when the expedition first saw it, totally devoid of trees, shrubs, and bushes, had led him to speculate on the probability or otherwise of verdure of any sort ever being present. Great was Dr. Aitchison's surprise, therefore when passing over the same ground in summer, to find that vegetation had sprung up a marvellous luxuriance, and of a flora distinct from anything he had before seen. Along the banks of the river stretch immense rich alluvial plateaus, which are only partially cultivated by irrigation from the river. The Heri rud is only fordable from midsummer to the end of December ; during the rest of the year all the traffic is conveyed across it over two bridges, one at Herat and the other at Tirphul. Dr. Aitchison has heard that there are ferry boats. but he never saw any. The General course of the river as far as Tirphul is from east to west, but from this point it makes a wide detour in a north-westerly direction until it reaches Toman-agha, whence it proceeds almost due north. The chief towns in the valley are Shekewan, Zindijan, Ghorian, Roynak, and Khusan. During early summer, owing to the extent of land under cultivation, as well as to the general fertility of the soil and the presence of the moisture of the spring rains the valley appears one vast green meadow. The towns just mentioned are not solely inhabited by cultivators of the soil, fully one-half of the population being owners of immense flocks of sheep and goats. During summer these semi-nomads disappear with their flocks to the great grazing grounds of the surrounding country, and only return late in the year to winter their flocks. The cultivation, as it at present exists, is very poor and second-rate compared with what it might be under a strong and vigorous Government, favourably disposed to the agricultural development of the country. The people look, and are miserably poor and badly clad : the houses all more or less in ruins, walls unrepaired, many orchards running to waste, and fields lying fallow. Everywhere signs of disintegration and poverty were apparent—a great contrast to the state of things found at Lashjowain. Yet the valley looked capable of maintaining 1,00,000 inhabitants were only labour and capital forthcoming to extend the cultivated area by developing and improving on the present system of irrigation works as without a liberal supply of water at this altitude nothing will grow There are no indigenous trees in the valley, except on the islands and low lands of the river, where in some instances dense forests of populus Euphratria occur, with several larger tamarisks, T. tetragyna, T. tetrandria, and others, and lycium barvatum, remarkable in early spring for its broad green foliage. Cultivation, as already stated, can only be carried out with the aid of irrigation, hence the villages and fields are situated in the vicinity of the river, unless as at Ghorian which is at some distance, and to which great irrigation channels have been led The houses of all these villages are built of sun-dried bricks, having with few exceptions domed roofs. There is generally but one door, and in the roof an outlet for smoke, such a construction as a window being unknown. For winter accommodation they are very comfortable, but in summer the heat within them is unbearable ; hence all those who can live out in the open under the cover of black tents made of goat's hair blanketing fixed on a wooden framework, sufficiently raised to permit of a free passage for air and yet preserve a certain amount of privacy. The orchards are here, as in the Harut valley, surrounded by high walls, a row of mulberry trees running round the inner side which are grown for the feeding of silkworms. As garden crops numerous vegetables are grown, of all which the Afghans are extremely fond, and some of these are excellent in quality. Even in England one scarcely expects to see finer beetroot, carrots, turnips, or cabbages than are grown here, besides radishes, tomatoes, brinjals, and chillies, which are all fairly good, with numerous pot-herbs. Requiring more care than ordinary field crops, there are also grown opium, tobacco, and some oil seeds. The field cultivation consists primarily of wheat, which is fairly good, but in some localities it is overgrown with rye, which is an indigenous weed ; barley of two kinds, the finer, hordeum hexastichon, considered fit for human food, and this is said to take a month longer to ripen than the other. At Ziudijan, one of the few Afghan villages, which Dr. Aitchison visited, there was a considerable amount of cultivation, which, however was much deteriorated by a continual deposit of sand blown across the river from the low hills on its right bank. To such an extent did this sand accumulate that portions of the village have been already submerged and great drifts have formed on the weather-side of all the walls. Where there was much of this sand spread over the level ground the turf consisted solely of plantago maritima. In August, when Dr. Aitchison last visited Ziudjan, the field crops had been harvested, and all irrigation had ceased, so that water was only to be obtained from the river some distance off, or from reservoirs enclosed and roofed over. Throughout the whole of his wanderings he neither saw nor heard of a single well, such

as one meets with in India, lined with masonry. The roofed reservoirs keep the water cool in summer and prevent its freezing in winter, but although the water deposits all the soil and foreign matter usually held in suspension by river water, it subsequently becomes highly charged with various organic impurities, rendering it for drinking purposes extremely injurious to the general health of the community. Dr. Aitchison also touched on many other valuable matters. He referred at some length to his zoological collections, which are considerable; and altogether the paper is a contribution of high value to our knowledge of Afghanistan.—*Standard.*

THE MADRAS FOREST.

A CORRESPONDENT writes to us:—Your paragraph on the Forest question in Madras, has a mournful interest. One could hardly have believed that Government could have thrown open its best reserves in Tinnevelly to practically indiscriminate cattle grazing. Yet on the best authority I learn that this was done last year. The not unnatural result was a bad fire in a reserve that had been protected for years, and thousands of rupees damage to timber and forest products. The damage to the country generally and to the ryots is incalculable. The Madras Government seems incapable of properly appreciating the forest question. The late Governor it is true took an interest in it, with the help of Dr. Brandis, the Forest Act was passed, two decades too late. But in the administration of the Act the present Governor is, I fear, as retrograde as ever, and listens to the short-sighted complaints of those who objected to conservancy on the ground that it is inimical to the production of cattle. The most ridiculous complaints are constantly published in the Madras papers. One man dilates on the importance of cattle to the country, and then deplores the exclusion of cattle from certain forests, forgetting that for many years all the forests have been given up to the grazier. The agriculturists do not send to the forests their wellbred useful cattle that plough and irrigate and draw carts. It is only the poor useless beasts worth no more than their hide, and the cows and immature animals, that are sent there. During their stay in the jungles the immature heifers are covered by worthless sires, and the worst features of Indian cattle breeding perpetuated. Fires are lighted intentionally to secure the crop of green grass after the first shower; or sometimes accidentally through carelessness, and each year the forest loses several years growth, and the doom of sterility is made surer and surer for the south of the peninsula. The grazier first destroyed all the more accessible jungles. Now he would lay his hands on the poor remains, saved so long by their inaccessibility, and which are now the so-called reserves. One of those who have lately aired their grievances in the Madras papers naively exposes the real nature of their claims. He speaks of "those who live on the outskirts of Government forests, and are unfortunate enough to own cattle." It is plain enough that the peasants whose villages adjoin the forests have become cattle dealers, their stock being reared solely on their neighbours' woodland. It is natural enough that they should be displeased at their usurpation being put a stop to, but their complaint should be regarded not as the legitimate complaint of a poor man deprived of an undoubted and reasonable right, but as the howl of disappointed avarice; disappointed in the hope of making a profit at the expense of the general public. In 1882 the business of conservancy seemed really to have started in Madras, but last year all progress seems to have been stopped, and the measures of Government are now actually retrograde. As I write, I can see on a neighbouring hill-side a beautiful line of fire which marks where the jungle is burning merrily. Very likely this is one of the Forest Department's reserved forests. If unburnt it might have yielded valuable products and provided bountiful pasture for cattle in the next famine. Now that it is burnt it will keep alive a few worthless beasts, rear a few ill-bred calves and plenty of goats and put a few rupees into some cattle dealer's hands, but not benefit the cultivator or the labourer. The country has lost so many hundred acres of timber so much more soil will be swept down in the next rains. Some stream will have a little less water in the hot season, and in the rains will be a worse torrent than before;—perhaps the extra rush of water exceeding the utmost that some engineer has calculated on, will burst some tank, or wash away a bridge;—and all because Government will not accept the teaching of science, and lends a ready ear to the outcry of the ignorant. Not only is the protection of the reserves neglected, but I understand that it is contemplated to reserve no more,—though the forests are far short of the requirements of the country. In some cases lands are being thrown open, not because they are unfit for forests, but because they may be wanted for increase of cultivation—a reason which is not justified by facts. A small extension in the area of badly cultivated lands is no great benefit to the community, but a bit of natural forest, which is worth reserving is a possession of great value, but which when once destroyed is almost impossible to be replaced.

SIR J. B. LAWES ON SHEEP FEEDING.

DR. J. B. LAWES of Rothamsted favours us with the following:—

The last number of the *Journal* of the Royal Agricultural Society of England contains the results of some feeding experiment carried on at Woburn by Dr. Voelcker: Forty sheep, in five lots of eight each, were fed on swedes and hay, in equal quantities to each lot, the distinguishing foods being linseed-cake, linseed and undecorticated cotton cake, mixed wheat, crushed oats and barley meal, and crushed oats and split beans. The experiment commenced on December 3 1 1885, and ended 106 days afterwards on March 19th 1886. The weather during almost the whole of this period was, as farmers have cause to remember, of a most severe character, and out of 40 sheep, 5, or 12½ per cent of the whole number, died from various causes.

One of the main objects of the experiment was to ascertain whether, at the present price, wheat was a cheap food for stock, and the conclusion arrived at appears to be that as a food alone wheat gave the best result; while, valuing the manure and food together, wheat and linseed cake were equal, and superior to the other foods. I hardly think that the results justify the conclusion, not from any want of care in the way which the experiments were conducted, but from the irreglar loss of sheep. When a limited number of animals are under experiment, the loss of one or two creates a most disturbing element, and even if one sheep does not do well it is very apt to interfere with the accuracy of our conclusions. There is another point to which attention must be paid when the object is to compare foods somewhat similar to each other in feeding properties. It is almost essential that the sheep should increase with something like regularity during the whole period.

If we take the sheep that were fed on the linseed cake, we see that such was the case. Their average daily increase during the first 33 days was 7 oz per day; for the second 31 days, 5 2 oz and for the third 39 days when the whether was much more favourable it was 10 1 oz per day. If we now take the sheep fed on the wheat over three periods we have 6 7 oz 1·8 oz and 14 7 oz. In the second period one of the wheat-fed sheep died, and another died in the third period. There were two experiments of sheep fed upon cake, 8 sheep in each case, making altogether 16 sheep, while three lots making 24 sheep, were fed on corn. The sheep that were fed on cake were all of them healthy, but as regards the sheep fed on corn, five, or rather more than 20 per cent of the whole, died.

The question is, to what are we to attribute this immunity from disease in the two lots of sheep that were fed on cake? The second period of weighing commenced on the 5th January, and lasted until the 5th February. Speaking of the weather of this period, Mr Glaisher, of the Royal Observatory, Greenwich, says:—'After the first five days snow fell on every day of the month—except the 14th—at one or other of the stations,' and of February he says, 'Snow fell on the 1st, 3 d, 4 h, 5 h, and 6 h.' During these 34 days, therefore, the coats of the sheep must have been sodden with snow almost the whole of the time. The sheep fed on linseed cake increased 89 lbs and those fed on mixed cakes 65 lbs, during the 34 days of severe weather; while the sheep in the other three pens only gained respectively 27, 25, and 23 lbs.

I am disposed to attribute much of this freedom of disease and capacity for thriving, notwithstanding the severity of the weather to the oil in the cake. The linseed cake contained 12 per cent of oil: each sheep would therefore receive about 1 oz of oil every day. Now, we know that starch and sugar produce fat in the animal body, but it takes 2½ lbs of one or other of these substances to produce 1 lb of fat, whereas in the oil we have the fat ready made, without any effort upon the part of the animal.

I do not think that feeders of stock, as a rule, appreciate as they ought to do the oil in the cakes. They know as a general fact that, by chemical processes and superior machinery, the cake contains less oil than it did formerly; but in purchasing their cake they do not consider the difference of 3 or 4 per cent. of oil as of much consequence, more especially when the seller informs them that with less oil they get a larger amount of food ingredients, which are of more importance.

Of course, the cake crushers are not in any way bound to furnish cake containing oil, and probably they would extract the last particle out of it, if the process were not too costly. I think, however, that farmers are somewhat answerable for the lower proportion of oil in the cakes of the present time. So long as a cake containing [illegible] are 12 [illegible] oil, [illegible] will sell for the same price, provided that both are free from impurities, so long will crushers find it to their interest to reduce the oil in the cake to the lowest possible amount.

In our paper on the 'Valuation of Unexhausted Manures,' published in the *Journal* of the Royal Agricultural Society, we gave a higher feeding value to linseed cake than to wheat: it is evident, however, that much of the linseed cake now sold might prove inferior in value to wheat. In one of Dr. Voelcker's reports published about twelve years ago, [illegible] cake as impure in consequence of the presence of a small quantity of foreign seeds, although this cake contained 12½ per cent of oil. Cakes may be purer now than they were formerly, but at the same time, they may be of a lower feeding value.—*North British Agriculturist.*

INDIAN TEA.

Chamber of Commerce, Calcutta, March 8, 1887.

The Committee of the Tea Associations give the actual outturn of the crop of 1886, from the returns they have been able to collect from Agents of Tea Gardens, and from a revised estimate for private and native Gardens as follows :—

		Actual Outturn of Crop, of 1886. lbs
Assam	...	35,627 350
Cachar and Sylhet	...	23,708,163
Darjeeling, Terai, and Dooars	...	18,610,682
Chittagong and Chota Nagpore	...	1,657,048
Dehra Doon, Kumaon, and Kangra	...	8,500,000
Private and Native Gardens	...	1,000,000
		79,098,243
against the Outturn of the Crop of 1885 of	...	68,730,219

From these figures it would appear that the outturn of the later months of the year was considerably in excess of that for the like period of 1885. In the revised estimate of the crop it was calculated that the outturn of private and native gardens, for which no actual figures could then be obtained, would amount to 2 million lbs., but, as the figures supplied for the actual outturn include a considerable portion of the produce of such gardens, it will be noted that the balance has been put down at 1 million lbs.

The exports of Australia, America, and other places have slightly exceeded 2 million lbs. and if the consumption of Indian tea in India itself and the requirements of Government be taken to be 1½ millions lbs., there would remain about 75½ million lbs. for shipment to Great Britain, of which say 70½ million lbs. had gone forward from Calcutta to the end of January last, and about ½ million lbs. from Kurrachee.

CHOLERA INFANTUM.

(By a Physician.)

How a Bad Case was cured.

Some of the most instructive reports of cases are made by parents, and not by physicians. It is too often the custom to lightly pass these accounts by, but some of them are well worth reading. The following will be read with interest, we think, by all ; it is written by a father, H. C. Sadd, Esq. :—

"I think it proper," he says, "that I should add my testimony regarding the value of 'Peptonizing Powders'—a new preparation —in preparing food for infants, for the effect my experience might have in inducing others to try the preparation in a like emergency.

"From the time of his birth we were unable to find any food which suited my baby, and at the age of seven weeks he was taken sick with cholera infantum. His surroundings and the general care he had received were good, and the disease was directly caused by inappropriate food.

"In four days from the time the disease was noticed he was reduced to a skeleton, and was not expected to live from hour to hour. During that time a number of expedients were resorted to, to provide him nourishment, but without success—cow's and goat's milk, and the different prepared foods, being rejected immediately.

"While life was at this low ebb, he was for three days kept alive by slight portions of Murdock's Food and brandy, but no progress toward recovery was noticeable until the eighth day of his illness, when the freshly peptonized milk was first used.

"A tablespoonful was given at intervals of two hours, and was retained in every instance. There was an improvement noticeable at once, and in twenty-four hours it was apparent that we had finally found a food adapted to him. The quantity given was increased gradually, until at the end of a week a full quantity was prepared each morning and night.

"During the week the baby gained one and a half pounds. Later double the quantity was prepared morning and night, and its use was continued until he was seven months old. His gain in weight during the time was regular, and averaged two-thirds of a pound a week.

"I have gone to this length for the reason previously stated, and with the hope that the details of my experience with Peptonizing Powders may induce others to give them a trial thereby possibly saving some infant life."

Milk peptonized with Peptonizing Powders was exhibited at the British Medical Association at Brighton last year, and was as pleasant and delicious as plain milk alone. It is certainly the most natural artificial food a young infant can have, and is capable of saving yearly thousands of infant lives. It is, by all means, the safest good in infantile diarrœal affections.

Registered No. 182.]

THE

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A WEEKLY

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VOL. XII.] CALCUTTA :—SATURDAY, MARCH 19, 1887. [No. 12.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 9TH MARCH 1887.]

Madras.—General prospects tolerably fair.

Bombay.—Reaping of *rabi* crops going on in several districts. Scarcity of fodder and of drinking water in parts of Dharwar. Fever in parts of eight, cattle-disease in parts of nine, and small-pox in parts of four districts.

Bengal.—Hot weather has now generally begun. Rain fell in parts of north Bengal and in Cuttack, and heavily in Chittagong and has assisted ploughing for early crop. *Boro* rice is doing well. Harvesting of *rabi* crops is in progress. Poppy is generally a good crop : capsules are being lanced and collection of opium has begun. Public health good.

N. W. Provinces and Oudh.—Weather getting warmer. Harvesting of *rabi* in progress. Prospects generally good. Collection of opium commenced. Supplies ample, but prices are still fluctuating. Public health good everywhere except in Benares, where cholera has appeared.

Punjab.—Slight rain in the Rawal Pindee and Peshawur districts. Health generally good. Prices fluctuating. Crops suffering for want of rain.

Centra Provinces.—Harvesting of *rabi* crops in progress. Prospects generally favourable. Fever, cattle-disease, and small-pox in places. Prices high in some districts.

Burmah.—Slight cholera in Akyab and Rangoon and in Pegu district, and fever in Hanthawaddy. A little cattle-disease in two districts, otherwise health of Lower Burmah good. Reports received from six districts of Upper Burmah : public health everywhere good. Food-supply insufficient in Shewbo and Minbu. Prices steadily rising in south of former district. Elsewhere prices normal. Agricultural operations progressing satisfactorily.

Assam.—Weather seasonable, but getting warm during day. Pressing of sugarcane and ploughing of land for *ahu* and *dumahi* crops still in progress. The rain has improved the prospects. Linseed in south Sylhet said to have been a little injured by insects. General health good. Prices steady.

Mysore and Coorg.—Standing crops in good condition. Prospects of season con tinue fair. Public health generally good. Murrain prevails in Pavagada taluk. Prices fallen slightly in Bangalore, Kolar and Kadur.

Berar and Hyderabad.—Weather clear and warm. Reaping of *rabi* continues, and threshing has commenced. *Tabi* crops prospering. General health fair. Prices steady.

Central India States.—Weather seasonable, though warm. Cattle disease in cantonment and district of Gwalior. Prospect of opium and cereal crops fair. Health good. Prices steady.

Rajpootana.—Week rainless. Weather continues seasonable. Tanks and wells low and drying everywhere. Crops damaged to a considerable extent by recent frost. Small-pox prevalent in a few States, otherwise public health generally good. Prices rising,—high in some places.

Nepal.—Seasonable spring weather. Prospects fair. Prices continue high.

Letters to the Editor.

THE EUCALYPTUS GLOBULUS.

TO THE EDITOR.

SIR,—With reference to the letter of your correspondent "Timber Speculator," in your issue of the 5th instant, I beg to supplement your judicious remarks with further particulars, in order to enlighten your correspondent more fully. It is beyond question that not only does the timber of *Eucalyptus globulus* "rank high," as you have said, but it is equal to teak, and, in spite of its rapid growth, is good close-grained wood. The manner of propagating the *Eucalyptus globulus* is as follows :—Prepare nursery beds and sow the seeds broadcast, and cover them lightly with sifted earth to the depth of a quarter of an inch. Water copiously. When the seedlings are about three months old, take them up, and cover their roots first with earth, then with moss, and place the plants, in that state, in fresh beds, or even simply under *pandals*, without being put into the earth. Keep them here for a month to recover themselves, then plant out in pits or trenches. The *Eucalyptus globulus* exhibits the most favourable growth when planted inside *sholas* of the indigenous trees (particularly in ravines) and a climate like that of the Nilgiris suits it very well. There are several species of *Eucalupti*, among which may be mentioned *Globosa E. piperitta*, *E. citriodora*, the red gum ; *E rostrata*, and the *Jarrah*, *E. robusta*, which may be grown with ease in India.

HEM CHUNDRA DUTTA.

Editorial Notes.

A CORRESPONDENT, who is at present sojourning in Gya, writes that the present condition of the poppy crop in that district is very satisfactory and hopeful, and that if nothing unforeseen occurs to injure the standing crops, a bumper harvest may be expected.

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ANOTHER correspondent informs as that he has discovered a very simple method of refining sugar, especially of the class now being manufactured in many parts of Behar by Messrs. Burrows, Thomson and Mylne's Centrifugal machine. But as our correspondent does not give any details of his discovery, we fear it is little use telling us of the fact, without giving us further particulars.

A CORRESPONDENT inform us that very favourable results have been obtained in parts of Behar by the use of a fertilizer composed as follows :—pigeon's dung 1 part, oil cake of *neem* seeds 2 parts, and well decomposed cowdung 5 parts. In clayey soils especially it has been found very efficacious. He adds that the people who tried it in fertilizing their fields, prefer it to anything else.

IN another column we reproduce a sensible article on the subject of establishing an 'Arbor Day' in India, in commemoration of the Jubilee. The suggestion is certainly an excellent one, and we hope that this opportunity will not be lost, and that the inauguration of an 'Arbor Day' in India will become a *fait accompli.*

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WHILE on this subject, it may not be amiss to ask what steps if any, have been taken to plant trees along the several lines of State Railways in India? By trees we mean such as will yield

good timber. This would in ten years yield a handsome profit on the outlay. Of course, we must not be understood to mean that the trees should be planted *close* to the line; but there is generally sufficient land on either side of it to admit of their being planted so far away as not to interfere with the line. When the trees become five years old, they might be supplemented by others being planted between the intervals. By this means there would be a constant succession of saplings; and while affording grateful shade along the line, would be a source of no inconsiderable income.

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A CONTEMPORARY announces that a new food for cattle has been patented in Germany which shows to what lengths food reform may ultimately extend. It is stated to consist of wood saw-dust mixed with certain chemicals and "other matter," the composition forming a "very nourishing and wholesome" food for pigs, cattle, and horses.

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THERE are signs that the Rhea plant is at last to be employed on a large scale commercially, for we note that Messrs. Ewing & Co., of this city, are advertising for tenders for the supply of Rhea plants for next season. Tenderers are to state the quantity available, the number of hours required to lay it down in Calcutta after cutting, and the price per 100 maunds laid down, or F.O.R., if preferred; also the month in which the plant will be available. Is it possible that this advertisement is the result of the development of Mr. Maries' discovery? We should much like to know. At any rate, here is a chance for the growers of Rhea, which they would do well to avail of.

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THE trade of the Colony of Victoria maintains a steady average. The official returns for 1886 have just been published, which show that the value of merchandise imported was slightly larger than in 1885, while there was a very large falling off in the export of merchandise as compared with the same year. The export of gold was only £1,946,503, as compared with £1,308,865 in the previous year, and among the items of import under the head of "Gold and Specie" is a sum of £631,527. It is said that, so far as exports are concerned, the year was one of the very worst that Victoria has ever passed through since she entered on her career of prosperity, and but for the people having extensive savings to fall back upon, and the success of the loans in England, the position of the colony would have been more unfavourable.

THE good people of Rangoon are at present very much exercised about the adulteration of Burmese paddy. A telegram dated 13th instant from Rangoon, states that an important meeting of rice millers was held there the day previous to consider the increasing adulteration of paddy by cultivators middlemen, and boatmen. Mr. Grieve, of Bulloch Brothers, presided. It was resolved that in future paddy should be bought by weight, the standard to be 46 to 45 lbs. per basket; two and a half baskets to be allowed for each lb excess, and two baskets deducted for each lb. deficit It was also resolved that all firms bind themselves not to take paddy rejected by another firm unless with the sanction of that firm. Any firm rejecting a boat must watch it and communicate with any other firm to whom it may be offered, who must then turn the boat away. This is business. Some such action on the part of Calcutta merchants might, with advantage, be taken in the matter of wheat adulteration.

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THE Leadville *Herald-Democrat* says:—"An analysis of many thousand tons of flue-dust showed its composition to contain the following: Silver from 20 to 37 ounces per ton; lead from 20 to 30 per cent; gold, from trace to $\frac{3}{4}$ ounces per ton; zinc, from $\frac{1}{2}$ to 9 per cent: arsenic, from trace to $1\frac{1}{2}$ per cent; silica from 18 to 27 per cent; iron, from 11 to 25 per cent. At the Arkansas Valley smelter this dust is worked with water and slaked lime, is mixed and made into bricks in a pug-mill, similar to those in use at a brick-yard. The place in which the work is done is surrounded by a brick wall, to prevent the interference of the winds, as the material is very light. The dust-bricks are sundried and again fed into the large furnaces.

AN American exchange tells us that a gentleman of the name of E. D. Wassell, of Pittsburg, has invented a new process of welding steel, by which steel bars of any content of carbon can be piled and welded together. He has demonstrated this by making a homogeneous weld of a pile made of bars containing 65 points of carbon. The process is not applicable to bars alone, but any miscellaneous steel scraps may be put up in fagot form and welded in the same manner by the rolling process. Another feature of this method is that the carbon can be reduced to any point desired; that is to say, steel of 65 points can be reduced to ten points in carbon while in the solid form without remelting. The process will cover the working of old rails and old steel scrap. The great usefulness of the invention consists in the fact that piles can be welded from which plates can be made as large as 10 by 4 feet, and thus, it is claimed, the method will cover the whole agricultural field and like branches of the steel industry.

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IN an article on the "Utility of Exhibitions to India," published in the *Asiatic Quarterly Review* of October last, Sir. E. C. Buck summarises "what Indian producers and manufacturers want done for them, or, in other words, the directions in which aid can be most usefully afforded through the agency of an exhibition for the promotion of the trade of India." These are: advertisement of its products and wares; the collection and classification of them; a thorough and continuous investigation into their character and uses, and the provision of new and extended markets.

***

THE *Indian Engineer* announces that boring operations for petroleum are being carried on in parts of the Rawul Pindee district; and a grant of Rs. 6,000 has been sanctioned by Government to enable the work to be continued. In addition to oil, there is every prospect of coal becoming a source of revenue in the same place. Although of an inferior quality to that found in Bengal (as it contains more or less sulphur and pyrites), it is somewhat liable to disintegrate rapidly, and is perhaps 15 or 20 per cent less valuable than Bengal coal. If, as stated it can be put into trucks for Rs. 2 to 3 per ton, there are many industries for which it can be made suitable and utilised. Regarding petroleum, a Russian Engineer reports that he has discovered a process of reducing it to a crystalline form, in which form, it may be easily and safely transported to any distance and then re-converted into liquid form.

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OWING to the absence of the usual rains, and also, no doubt, to the depletion of stocks during a long period of brisk exportation, says the Lahore paper, prices have risen considerably throughout the Punjab. The following table shows the average price of wheat in seers for the rupee, for the fortnight ending February 15th, as compared with those for the corresponding fortnight of 1886

	1886. Seers.	1887. Seers.
Hissar	24	13
Hoshiarpore	25	13
Umritsur	22	12
Rawul Pindee	23	12
Hazara	23	12
Bannu	28	15

***

IT is reported that at a meeting of the Indian section of the Society of Arts on the 11th February, Dr. George Watt read a paper on "The Economical Condition of India." Sir George Birdwood presided. The lecturer said the intrinsically valuable products of the country were employed at the present day by the natives of India only, or were not used by man at all, although they possessed properties which seemed likely to make them articles of European trade in a not far distant future. He enlarged upon the ignorance which he said had for very many years prevailed on every Indian question. This ignorance had caused English goods to lie in the markets of German, American, and French manufacturers: He described the non-European, and consequently unimportant commercial products of India, and proceeded to remark upon the improvement of the internal and foreign trade in the

minor products of the country. He referred to the peculiarities of the country as a vast agricultural field, and remarked that the development of its economical resources must to a large extent mean the improvement and extension of its trade in the annual crops removed from its plains He also dealt at length with the chief food substances exported from India, and described in detail the narcotics of the country, including under this head tea, coffee, and tobacco. A discussion followed.

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ACCORDING to a local daily, an impression appears to have got abroad that the Burrakur Iron Works owe their success under Government management primarily to the constant receipt of large Government orders—a patronage which, it is hinted might not be forthcoming in the event of the works being taken over by private capitalists. As to the first of these points, our contemporary believes the idea is unwarranted. He goes on to tell us that: 'The chief profits of the Burrakur Iron works are derived, we understand, from private orders. Municipality and local Boards, and private firms such as Messrs. Walsh Lovett and Co., and Mitchell and Co. have extensive dealings with the works. Whether in the event of the works being taken over by private enterprise they could be supported without Government patronage we are unable to say, but no doubt speculators, before laying out money on the concern would make some terms with Government as to the extent to which they might look for its orders. The Government for its part, we find, declared in a resolution published in the *Gazette* in 1882, shortly after it had taken over the works from the Bengal Iron Works Company, that it had no wish to keep the works in its hands, and that it would aid with its patronage any private capitalist who was willing to take them over." This ought to be quite sufficient we think, to allay any doubt on the subject.

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WE are very glad to learn from the *Englishman* that a promising proposal to extend the demand for Indian teas is at present under the consideration of the Indian Tea Association. A South Sylhet planter of many years' experience in this country and some knowledge of the trade at home has, we are told, submitted a scheme to the Association for promoting the sale of Indian teas in America and Canada, and the Association has referred the matter to the London Secretary for his opinion, which, we trust, may be in its favour, as the scheme is deserving of every assistance. The promoter desired to stimulate the retail sale of Indian tea in the United States and Canada by enabling consumers to buy direct from the producers and so avoid the possibility of being deceived into buying a mixture of China tea as Indian manufacture. He undertakes to ship tea direct from Calcutta at his own risk and cost, and asks by way of financial support a subsidy from the Association for advertising purposes equal to half an anna per acre under tea. This sum would equal a contribution of Rs. 16 for a garden of 500 acres. The Association would have neither risk nor trouble the advertisements, at a small cost to the industry, would keep Indian teas before public notice ; and the consumer could rely upon getting the genuine article, and not a hybrid compound of unknown elements.

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THAT the scheme is a move in the right direction, many will agree, while it has all the merits of novelty and feasibility, promising as it does to open up what is practically a new market for the retail sale of Indian teas, and the opportunity should not be missed by those whose interests are concerned. The SouthSylhet Tea Association, we learn, are strongly in favour of the scheme, and the Committee recently passed a resolution "recommending the proposal to all gardens in this district, and requesting our Honorary Secretary to communicate with the Honorary Secretary of the Indian Tea Association in Calcutta with reference to the support of other districts in carrying it out." The Committee further went on to say that "taking into consideration the low prices ruling for Indian tea in England, we are of opinion that the Indian Tea Association General Committee in Calcutta should be urged to take steps to open up new and promising markets, such as was done with marked success in Australia four or five years ago. The monetary cost to the gardens will be small compared with the results obtained, and it is very necessary that some vigorous measures should be taken to check the downward tendency of the market value of the produce of our estates. The Calcutta Association, as we have stated, have given their support to the proposal. Should it be carried out and prove a success, then many others will no doubt be found ready and willing to follow in the footsteps of the promoter and to join in the trade without asking for any help whatever from the Association. All interested in the tea industry in this country would do well to give their support to the scheme, for it holds out a promise of very great profit in the immediate future.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 9th March 1887:—Except in parts of Bengal and Assam and in two districts of the Punjab, the week under report has been rainless. The *rabi* harvest is in progress generally throughout the country and has been completed in Berar. The crops are on the whole in a promising condition, though in Bombay, the North-Western Provinces and Oudh, and Rajpootana frost and blight have caused some injury. In the Punjab the prospects of the *rabi* have not improved and rain is still urgently wanted everywhere in the province. In Madras the standing crops are in want of rain, and prospects are only tolerably fair. The outlook in Mysore and Coorg continues satisfactory. The spring rice is doing well in Bengal, and ploughing for the early rice is proceeding in Assam. The sugarcane harvest is in progress in Madras and Bombay. The collection of opium has commenced in Bengal and the North-Western Provinces and Oudh. In Central India and Rajputana the crop is generally fair. In Bengal indigo sowings are in progress. Except for an outbreak of cholera in Benares, the public health is generally satisfactory in all provinces. Prices are fluctuating in the North-Western Provinces and Oudh, and the Punjab, are falling in Mysore and Coorg, and are high in some districts of the Central Provinces and in some States in the Rajputana Agency. Elsewhere they are generally steady.

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THE following is a summary of Messrs. Wm. Jas. and Hy. Thompson's Fortnightly Circular of Indian tea, dated London 17th February, 1887:—The fortnight's auctions have comprised 53,500 packages, including 46,000 packages of fresh import, 2,500 packages of reprinted tea, and 5,000 packages from Ceylon. The effect of reduced supplies brought to market, and henceforward available, has been counterbalanced by a temporary slackening of demand from the country—not unlooked for, in view of the vast volume of business transacted during the last four months, and the large stocks held by the trade—and the result has been to diminish competition, some dealers having ceased to buy for the time being. This has affected the general tone of the market, and has slightly lowered the quotations for all common qualities of leaf and broken; but good teas as a rule have maintained their value, and in some cases have improved, the short supply of good Pekoe and fine broken Pekoe being now appreciated by the dealers, who are not well stocked with these kinds. From Calcutta our latest telegraphic information states the actual shipments to 15th February to be 72 million lbs., which is rather less than was anticipated, and it would seem that the quantity remaining unshipped has been somewhat fully estimated. The only sale held on the 10th, when prices fell ½*d.* to 1*d.*, in sympathy with home advices ; this practically concludes the season's business, Ceylon teas are selling freely, without any quotable variation in price except a tendency to weakness in rates for such as are not of first-class quality.

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A 'SHAREHOLDER' sends a very reasonable complaint to a contemporary, regarding the present system of classifying Indian teas. He says :—

I have just received a copy of a report of a tea company, and the outturn for last season is about 19,000lbs. Orange Pekoe, 16 000lbs ; Broken Pekoe, 72,000lbs ; Pekoe 63 000lbs ; Pekoe Souchong 14,000 lbs. ; Broken mixed 21,000 lbs ; Pekoe Fannings, and 18,000 lbs. broken tea. Here are seven classes of tea, four of them broken, a certain consequence of so muchhandling and sifting, besides adding to the cost of the tea, and likely to make the cash

returns for the whole crop to be less than they otherwise might be. The seven classes are stored away in separate places, until sufficient quantities are collected to make large "breaks." Meanwhile the teas are not improving, time is lost in getting them to market, and interest against the company is accumulating at the bank. Are these seven classes wanted by the trade? I can hardly think so. Brokers or buyers are not apt to be deceived by fine names. Would not three classes be sufficient, viz., Pekoe, Pekoe Souchong, and broken tea? By this plan there would be a much smaller proportion of broken tea, the cost would be less, and the tea could be sent earlier to market. So that dividends of companies could be paid not later than first week in January. The report I am now examining gives very little information; it seems put together in a perfunctory manner; very inexplicit, if not positively confusing in the statement by the agent on last season's operations. Perhaps shareholders should not expect a high standard of literature in the reports of limited companies, but they cannot be considered unreasonable in expecting that cash statements should be expressed accurately and explicity. At the rapid rate at which reports of tea companies are being condensed or reduced, I expect in a little time that reports will only give the name of the company in small type, the names of agents or Secretary in large type, and some times the date.

We do not see the necessity of making these fine distinctions; and quite agree with the writer that three classes are quite sufficient for all practical purposes, and moreover would prove of advantage in the end, both to buyers and sellers, as well as to growers.

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THOSE interested in the introduction of Mauritius sugar into this country are determined that it will not be for want of 'push' that they have failed to foist their sugars upon us. It will be remembered by our readers that some time last year the Mauritius Government asked the Government of India to give them a free advertisement all over the country by giving publicity to the fact that, while animal charcoal was used in sugars manufactured in India—a practice offensive to the religious prejudices of the Hindoos—those manufactured in Mauritius and exported to this country were free from this objection; therefore the natives of India should use Mauritius sugars only. The Government of India, however, wisely declined to give effect to such a proposition, and since then spasmodic attempts have been made at intervals to revive the subject in the Indian press. The "good people" of Mauritius have, we see, succeeded in enlisting the sympathies of the people of Bombay, as will be seen from an article published in a recent issue of the *Times of India* (and which we reproduce elsewhere), in which it is stated that "Mauritius sugars do not contain any substance repugnant to the religious creeds and sentiments of the Hindoos." It is further stated that only three substances are used in Mauritius sugar for purifying, clarifying, and discolouring cane juice, *viz*, lime, sulphurous acid and phosphoric acid. Now without going any further, it may be asked: what is the source of phosphoric acid and phosphate of lime, both of which substances are used in Mauritius in the manufacture of sugar? Is it not bones? It may be true that no animal *charcoal* is used, but *bones* are, in some form or other. It appears to us, therefore, to be a little too 'finely drawn' to say that no substance repugnant to the religious creeds and sentiments of the Hindoos is used in the manufacture of Mauritius sugar. It is also unfair for our contemporary to assume that false reports in respect to these sugars "would almost seem to have emanated from some of the sugar makers on the other side of India, who wished to stir up a caste prejudice against Mauritius sugar." There is no false report: it is perfectly correct; and the sooner the fact is admitted by Mauritius manufacturers, the better. The Bengal sugar manufacturers do not take such pains to publish false reports.

SINCE writing the foregoing lines, we have received some proceedings of the Chamber of Agriculture at Port Louis, Mauritius, (reproduced in another column) concerning the processes pursued in that island for the refining of sugar. It will be seen that the Chamber declare very specifically that the statement that animal charcoal, or any other such substance, is used in preparing for the Indian market, sugar manufactured in the island, is absolutely false and unfounded. The Mahomedan bishop of the island appends his certificate to the proceedings, declaring that Mauritius sugars do not contain any substance whatever, that might affect the religious feelings of the Hindoos. We should, however, like to see a certificate from a *Hindoo* bishop before accepting this declaration as absolutely correct.

WRITING of the agricultural implements of Catalonia, Consul Scheuch says:—The state of advancement of agriculture in any region may be judged by the greater or less perfection with which work is done, dependent, in a great part, on the spirit of routine or progress in the use of implements and machines. Here, as elsewhere, one of the principal agricultural implements is the plough. The one universally used throughout Catalonia till within a very few years, and now quite common in some parts, is the primitive "rudder plough." The principal parts are the share or iron point that penetrates the ground set into the share-holder by the other end. This holder, which is a stout piece of wood, carries two branches *orjas*, (wings), one on either side, which scatter and pile the earth turned up by the share. Finally, there is the rudder, to which the horses or oxen are yoked, and the handle, placed behind, to guide. Among modern ploughs most in use are those with one fixed share, divided pole, and a blade or root cutter in front in an oblique direction to the surface of the earth. Those most used, no doubt on account of being manufactured in Barcelona, although of foreign invention, as their names indicate, are "Howard's" and "Ransoms." In both kinds there is but a single ploughshare, a blade for cutting roots, one or two wheels in front, two handles, and the entire frame made of iron. Some of the Ransom pattern have wooden frames. To break up the lumps of earth the common rake is used. The most simple is composed of a piece of wood with a row of iron prongs or small blades inserted. Joined to this piece of wood, in T-shape, is a pole about five feet long, which serves as handle. Another style of rake still much used, although of very old date, is a rectangular frame with cross-pieces of wood, from which and from the sides of the frame project the prongs. Of late years modern rakes of the Howard and Ransom pattern are manufactured in Barcelona, and in use. Other implements employed are the ordinary spade, the mattock, the hoe, the scythe, the sickle, &c. The introduction of agricultural machines and other costly apparatus in Catalonia will always be difficult, first, on account of the hilly lands, and, second of the minute distribution of rural property.

THE following notes regarding the resources of the Colony of Queensland will doubtless interest our readers:—

Sugar growing is now becoming a very important industry. In 1884 there were 57,687 acres under cane, of which 29 930 acres were crushed, yielding a return of 33,361 tons of sugar, which may be roughly valued at £912,905.

In 1883 the quantity of land under arrowroot was 227 acres, which yielded 390 964 pounds, while in 1884 there were 352 acres, which produced 574 768 pounds, the estimated value of which was £11,304.

The number of horses in 1884 was 253,116; horned cattle, 4,266.172; sheep, 9,308,911, and pigs, 51 796. Export of wool in the same year, £1, 889,504; hides and skins £109 291; tallow £76,019; horses, cattle and sheep, £572,010, salted and preserved meat, £69,092—together, £2, 715,918.

As for the mineral resources of the colony beside gold mining, an important discovery of tin was made during the year 1887 at Herberton in the Cardwell district. The returns are very good, and a large and apparently permanent township has sprung up in the locality. It is estimated that about £1,165,576 worth of ore has been raised at that place. There are lead mines in operation at Ravenswoop the ore from which yields a good percentage of silver. Cinnabar, antimony and manganese are also among the mineral products. The exports of gold and silver and metals for 1884 are given as follows: Antimony, £10,968; gold £923 010; tin, £ 28,457; copper, £3,014; galena, £1,110; silver ore, £23,696; silver lead £1,06?,—together, £1,191,315.

Near St. Lawrence and on the adjacent islands marble of fine grain is found. Excellent coal has been discovered in some localities and new finds are being frequently made. There were 129,980 tons of this mineral raised during 1884, valued at £54,160. At Burrum, in the Maryborough district splendid coal has been dis-

covered and a railway constructed to the spot, in order to bring the mineral to the port of Maryboroughs. Valuable timber grows in abundance, the trees which supply the hardwood which is most in demand being flooded gum, iron bark, blackbut, turpentine, stringy-bark, spotted gum, blood-wood, beech yellow-wood and dark yellow wood. The imports for the year 1884 were valued at dark £6,381,976

The resources of Queensland are so varied and valuable that the colony has a most promising future even in the event of the gold mines proving less productive.

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The value of salicylic acid in the treatment of diseases of animals—especially farm animals—is now becoming general. Thus Dr. H. Endemann writes as follows in the *American Agriculturist* on this subject :—

Since the value of salicylic acid in the treatment of diseases of man was fully established, about ten years ago, its use by veterinarians has been commenced and its value, even in this field, has now been put above doubt This information is not given with a view to render the services of skilful veterinary physicians unnecessary—for in all serious affections their aid should be invoked as speedily as possible—but for the reason that in all such cases where a surgeon is not speedily at hand the farmer may do his best to battle disease in his stock until a surgeon can be obtained and likewise to make him a better assistant. Among the diseases to which pigs are subject the following have been successfuly treated by salicylic acid : Run-around croup or wildfire and pox. In the first named disease the largest doses are required. On the first day from one-half to one drachm five times during the day ; that is every two or three hours. On the second day, one half of a drachm three times a day. In cases of croup one-quarter of a drachm is given every two hours, the salicylic acid to be dissolved in about three quarters of a pint of hot water If the pigs possess yet sufficient desire to feed, the salicylic acid may be given in sour milk. In cases of pox each two pigs receive about one-twelfth of a drachm, dissolved in four ounces of hot water per day. In cases of anthrax among cattle, salicylic acid solution (one part of salicylic acid dissolved in 400 · parts by weight of luke-warm water) is used for cleansing inflamed portions several times during the day. The hoops, especially the crown, are powdered with a mixture of salicylic a cid and talc. Stall-fed cattle are subject to many diseases, especially diarrhœa and inflammation of the udder. An inflamed udder should be washed with a solution of salicylic acid—one part in 1,000 parts. Cows frequently, before dropping their calves, are troubled with diarrhœa, by given the cows about one quarter of a drachm of salicylic acid per day, the diarrhœa is stopped, and the dropping of the calf can thereby often be prevented. Sucking calves which are troubled with diarrhoea, are given about one-eighth of a drachm of salicylic acid, dissolved in warm water per day. The cow, is likewise dosed with about one-quarter of a drachm per day. If the diarrhœa in the calf has ceased, it is only necessary to continue the doses of the mother for some time. One part of salicylic acid dissolves slowly in two parts of water of sixty degrees Fahrenheit, and at once in twenty parts of boiling water. The solutions should be made in wooden or earthen vessels, and for stirring a wooden spoon should be used since a salicylic acid solution in contact with iron assumes at once a more or less deep violet colour, this does not interfere with the action of the acid however. Of late the oil of wintergreen has been frequently used in the place of other salicylic acid compounds, and is preferred by many to salicylic of soda or salicylic acid. With many persons this has become a regular household remedy.

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The Duke of Marlbourgh has been turning his versatile genius to the solution of the currency question, and in a long letter addressed to a Manchester paper on the subject, he maintains that English agriculture is brought to ruin by the competition of Indian wheat. He asks : " What is the meaning of this gigantic rise in the volume of Indian wheat exports from 2,000,000 bushels in 1872 to 45,000,000 bushels in 1885, on which we are told that the profit to the Indian cultivator has as a rule consisted only of the favourable exchange rate ? From the United States during this period the export to England has fallen from 122,000,000 bushels to 75,000,000, while the average price of wheat in England has diminished by over 10s. per quarter. The advocates of the 'Perish England!' policy will tell us that we have received an inestimable boon, while the Indian cultivator has also benefited, though the truth is our English farmers have been yielding up their capital year by year ; and now that the farmer's capital has vanished, the land itself is going out of cultivation, at a further cost to the capitalist owner of £15 to £20 an acre, dead loss to the community if later on this land is to be brought again under cultivation. And while this capital has been lost in order that people should have so-called 'cheap bread,' with bad trade and low wages, it has not even gone into the pocket of the Indian cultivator. It has gone, if the truth is to be told, in stimultating the cultivation of land in India which, under a normal condition of exchange, would have remained uncultivated. That is to say, with the rupee worth 22*d* and with silver at 60*d* the wheat product of certain lands in the Punjab could not be sent forward to this side, but now owing to the present depreciation of silver these lands are brought under cultivation, and thus the margin of cultivation in India is forced down, and acres formerly cultivated in England are cultivated instead in India. If economic doctrinaries are to be permitted to plume themselves on the advantages accruing to India from the depreciation of their standard and the consequent destruction of English agriculture, it is high time we organised to face a position so intolerable. " The standards were made for man and not man for the standards." This is altogether a new line of argument, and is interesting from the novel position taken up by the Duke. There will not, we fear, be many who will share his Lordship's views. It has been shewn conclusively, we think, that " low exchange " as it is called, does *not* benefit the grower of Indian wheat ; and no one, we think, will hail the return of silver to its original standard with more satisfaction than the Indian wheat grower. There is such a display of ignorance on this currency question so far as it relates to India, that one has no patience to combat such foolish arguments as those put forward by his Grace of Marlborough.

ADULTERATION OF INDIAN WHEAT.

This subject has again cropped up ; this time in the columns of the *Times of India*. A correspondent sends to that paper the following queries.

1st. What percentage of dirt is found in American wheat shipped to Liverpool ?

2nd. What percentage of dirt is knowingly purchased by Bombay merchants ? Is that percentage the same with all the large firms in Bombay, and if so, is it determined by any one, and by whom ?

3rd. What percentage of dirt is knowingly shipped by Bombay merchants ?

4th. What is the percentage found in the wheat (shipped from Bombay) at Liverpool.

5th. Can any one tell me what proportion of the " dirt " admixture found in wheat prior to bagging in Bombay is really dirt or earth, or what part is " other seed," and what seed is most found ?

Will any of the numerous brokers in Bombay, any of our young merchants, spare a little time to enlighten the outside public on the general question of wheat adulteration, tracing the purchase of the grain from the threshing floor in the far mofussil to the quay in the Prince's Dock, and telling us where, how, by whom, wheat is adulterated, and who gets or shares the profit from the adulteration ?

The subject has been thrashed out in our columns, and we had an idea that it had been conclusively shown that it was not the cultivator or the middleman who was responsible for the dirty condition of the Indian wheat shipped from the Bombay and Calcutta ports to Europe, but the important export firms ; and, we are ashamed to acknowledge it, *European firms mostly*. That this should be so, is a reproach which these firms should take the earliest possible opportunity of removing There was a time—many years ago—when it was found impossible to get wheat in a sufficiently clean state to fit it for foreign markets, and this was one reason why our wheats were not thought much of in Europe. But since it came to be found out that the Indian grain was really of very superior quality, and an impetus was given to the export trade in wheat, some efforts might, we think, have been made by the mercantile community to do

away with the premium paid upon adulteration at a time when the foreign trade was comparatively insignificant. That the producer has shown himself willing and ready to supply grain free from dirt and adulteration is a fact now widely known, but the purchasers in India (to wit the large export firms both in Bombay and Calcutta) are not willing to pay higher prices for clean grain, or in other words, decline to remove the 5 per cent 'refraction,' as it is called, which they have been in the habit of deducting for impurities. Their excuse is that the state of the markets *at home* will not permit them to do away with a pernicious practice, which they well know depreciates Indian wheat in the United Kingdom and other foreign markets. We are not prepared to accept this plea in the face of the constant complaints made in England of the dirty condition of the wheat shipped from India; and the unwillingness of the Bengal Chamber of Commerce to remove this mischievous practice does not improve matters. It has been made abundantly clear by the Bengal Agricultural Department that wheat of the finest quality, and free from mixture or dirt can be supplied in very large quantities for export purposes, if only the export merchants will pay higher prices for it, *or*, remove the 5 per cent 'refraction' for impurities. We have the further testimony of an apparently experienced correspondent of the *Times of India*, who sends to that paper answers to some of the questions we have reproduced above. He says :—

Having had several years up-country experience in the wheat trade, I beg to send you the following information in reply to some of the questions asked in the letter on 'wheat adulteration,' which appeared in the columns of your issue of the 8th. Wheat is *more* or *less* adulterated with mud and other foreign matter from the threshing floor according as the outturn of the crop is large or small. In the Nerbudda Valley in the Nagpore and Chhattisgurh provinces, where the very best wheat exported from India is grown, cultivators, as a rule, hardly ever bring their produce to market with a heavier admixture of mud than 4 per cent in a short crop; while in a good season it is not rare to find wheat with barely 1 per cent. Wheat of the descriptions of white *pessi*, white and red *boatka*, yellow and red hard, when purchased direct from growers, are generally uniform in quality. But parcels are also met with, exhibiting a free admixture of the different classes. Such lots, of course, unless there exists a very pressing demand, can only find buyers at half or two-thirds the price at which the better qualities are selling. The standard of admixture —I mean sand, mud, and other depreciating matter—is for the United Kingdom, I believe, 4 per cent. It used to be that when I had something to do with the business. The system lately introduced into Bombay has caused considerable harm to the wheat trade up country. European houses here contract with native dealers for produce to be delivered, free of all charges, at their godowns near one of the bunders, which has railway sidings. The system is called 'railway delivery,' although I fail to make anything of the expression. The wheat thus contracted for is, under certain stipulations, particularising the percentages of dirt and inferior qualities of wheat, that the quantity contracted for should contain. That this is a very pernicious system, inevitably leading to evil results to the Indian wheat trade, I will proceed to explain by exemplification. The white *pessi*, that is grown extensively in the valley of the Nerbudda, comes to market almost pure white soft,—that is, 95 per cent soft white; hardly ever above 2·5 per cent mud; balance inferior grains. Now, were this wheat shipped in this state, it must take a foremost place in any home market. The reasons are obvious. But what is the reason that it does not? This. The native houses instruct their up-country agents to despatch white *pessi*, containing 4 per cent mud, 80 per cent soft white, 16 per cent inferior qualities. The thing is done. They add required percentages of mud and inferior qualities, generally a little more on the speculation of the consignment, passing muster, and the lot is forwarded to Bombay for shipment. Dealers in the mofussil formerly sold to Bombay agents the wheat as they purchased it from cultivators. But taking a lesson from these city gentlemen, they have also begun to adulterate the article; and it will not be long before growers follow their example. Eventually, to save himself the trouble of mixing up the produce of his fields, the *kunbi* will sow the different qualities together. Instead of your Chamber of Commerce meeting to listen to long speeches about nothing particular, if it prevailed upon individual European exporters to be satisfied with present small profits, and to pay higher prices for wheat of the very best quality, refusing to countenance any adulteration, Indian wheats, specially white *pessi* (No. 1 club), white *boatka* (No. 2 club), and yellow hard, would command as good, and perhaps better, prices than the productions of any other country.

Here is a state of things which is nothing short of a scandal. That *European* exporters should lend themselves to this system of fraud—for it is nothing else—is what astonishes us; and the astonishment is heightened when we find the two Chambers of Commerce openly countenancing the fraud, instead of doing everything in their power to put it down.

THE DISEASES OF SILK WORMS.

[*Continued from last week.*]

The following is the continuation of the paper contributed last week on this subject by a correspondent :—

The disease called *pebrine* shows itself outwardly in Europe and in America by the dwindling away of the worms and their inequality in size; eating little, they do not grow as large as when in their normal state. At the end of a few days black spots frequently make their appearance on the skin, resembling punctures or burns. The anal horn, the prolegs, and the soft parts between the rings are especially subject to these black spots. In the interior of the body microscopic observation reveals the presence of innumerable corpuscles of an ovoid shape, filling the cells of the walls of the stomach, those of the silk glands, the muscles the fatty tissue, the skin, and the nerves: in a word, all the portions of the body. There are often so many of them that the cells of the silk glands become swollen and white and appear to the naked eye to be sprinkled over with chalky spots. The silky liquid always remains free from the parasite, but is much less abundant than when the worm is in a healthy state. In addition to the exterior symptoms it is noticed that the prolegs do not seem easily to attach themselves to objects. In the crysalis, the abdomen is very much swollen and the rings are stretched; while in the moth, part of the body and the wings have a leaden colour.

The *pebrine* is identified by Mr. Wood-Mason with the disease called *rata* by the natives of Bengal, formed by a unicellular fungus probably belonging to the group of 'Schizomycetes.' Corpusculated worms, according to Mr. Wood-Mason, are recognisable by their dwindled or emaciated form, by their pale, etiolated (whence the native name *kata*), and jaundice-like colour (due to their yellow blood showing through the skin and cuticle), and by the failure of their natural activity and voracity (languor and distaste for food), but rarely by the outward sign which in Europe by its common presence suggested the name of pebrine. Nevertheless, careful search, especially on the more delicate parts of the body such as the ventral surface the creases between the legs and the body, and the caudal horn, frequently reveals the existence of some very minute black specks, and also of the blackened wounds which the worms receive from one another's claws and in crawling amidst the tangled litter of leaves and twigs on and upon which they feed. Mr. Wood-Mason states that he examined no worms, from whatever disease suffering, as to which he can confidently affirm that they contained absolutely no corpuscles, though worms, without corpuscles no doubt do exist. He also found the corpuscles occasionally in eggs ('seed,') and in very young worms in which no external signs of any kind of disease had yet appeared. Mr. Riley also bears testimony to the contagious and destructive nature of *pebrine*. The corpuscles have been found in all the stages of the insect's life from the egg to the moth, whence they again pass into the egg. It is therefore more hereditary than *flacherie*, which is only indirectly so. Corpuscles in the male cannot affect the egg, hence attention should be directed to the female, which if found *pebrinous* should be destroyed.

Pasteur found that if the pebrine were contracted after the fourth moult, that usually, the larva would show no external signs of it, while the moth and therefore her issue would swarm with corpuscles. It is suggested that especially the worms which spin last should be examined microscopically for the disease while still in the chrysalis state. There is none of the langour exhibited in worms suffering from *flachirie* in those affected by pebrine. Riley's account of Kallot's method of examination for *pebrine* will therefore be of interest :—

"Three or four days before the cocoons are taken from the branches we take here and there from the early spinners, as well as from the late several hundred cocoons; as for example 500 from a lot of 90lbs. This sample should be placed in an oven or warm room, where it will be kept day and night at a temperature of 100 to 110° Fahr. and a high degree of humidity, in this way the formation of moths is hastened. As at this time the cocoons of the lot itself are

remaining at a temperature of from 75 to 90°, and often during the night at lower temperatures, we shall still have to stifle them if the lot be discarded for breeding purposes or to string them into chains if, on the other hand, they prove healthy. Every two days, we take ten chrysalises from the sample and examine them microscopically for corpuscles. If we find them in the first eight or ten days, no matter in how small quantities we can be sure that the proportion of *pebrineus* moths will be considerable. When the chrysalises are mature, which is easily seen by their eyes becoming black and the eggs harder to break under the pestle, and also that some of them are turning into moths, we proceed to the definite examination. We crush, one by one, the moths which have come out and chrysalises which remain, and search for corpuscles; the proportion thus formed will not differ materially from that which exists in the whole lot." The examination of the chrysalises may also be made in the manner already described for *flacherie*.

The corpuscle of the *pebrine* is generally oval, though sometimes pear-shaped in form, being from 3 to 4 (—·00004 of an inch) on its greatest axis and about one-half that length on the shorter, and is generally found singly. The ferment of *flacherie* is usually found in short chains, whose links, almost spherical, have a diameter of about 1m.

Mr. Wood-Mason's inquiries show unfortunately that both *flacherie* and *pebrine* have attacked the Bengal filatures in a manner that causes the gravest apprehensions for the future of the silk-worm industry in Bengal. He reports:—

"Wherever I have gone the rearing-trays were covered with dying and sick worms. Worms that were fairly healthy to all external appearance and would undoubtedly yield good cocoons, and worms that were brought to me as perfectly healty, alike contained pebrine corpuscles. On many trials I have seen worms with simple pebrine (*katu*) and worms with *kala shird* (flacheri) commingled in almost equal numbers. Some few rearers have lost everything, all have lost a large percentage of the worms *which hatched out from the 'seed.'* How much of this 'seed' has proved sterile and in how much as development proceeded to its finish and yet no caterpillars have seen the light. Of this no account seems to be taken. I believe that fully one-third usually, and a much larger proportion frequently, prove practically sterile either from never having been impregnated or from the worms dying within the egg as soon as evolved—a belief which is founded upon the results of observations carried out during the past year in my laboratory. Then there is the concordant testimony of all the most experienced managers of filatures, who live in the midst of the rearers, to the havoc which these diseases are working among the worms, and which appears to me to be steadily on the increase."

"Finally, the eagerness displayed by the peasants everywhere for healthy 'seed,' their professed readiness to buy the healthy 'seed' when this shall be forthcoming, and to modify their, in many respects, vicious mode of culture in such a manner that the healthiness of the renovated stock may be maintained, and their lavish promises of reward (all the first fruits of the new stock were mentioned by one set of men) to him who shall be the means of providing the healthy 'seed' are facts which all tend to show that we are in the presence of a real calamity by which the peasants are deeply stirred. It is my conviction that if remedial means are not adopted forthwith, an essentially cottage industry, which might, there is little doubt, by a little fostering care from the State, be preserved, nay, magnified many times, if one is to believe those who know most about the subject, will have received a blow from which it will never recover, and it will gradually dwindle away into a thing of the most insignificant proportions. There is another point, which is, I think, worthy of mention, and it is that owing to the scarcity and consequent high prices of cocoons, the native looms in the Moorshedabad district are almost at a standstill and few, if any, good corahs are being turned out."

The same writer adds :—"of all the diseases to which the silk worm is subjected *perbrine* is, beyond all comparison, the most formidable. I will say that it is the only really important one and that all others at present known may be neglected; it is contagious diseased worms passing over healthy worms and wounding them with their claws, infecting them with the disease; healthy worms eating food soiled by the excreta of diseased ones becoming themselves infected; it is infectious, being carried by the air from worm to worm, from tray to tray, from house to house, and even from place to place, though these places may be at considerable distances from one another; but above all, it is hereditary, passing from mother to offspring through the egg. The corpuscles have been demonstrated to be the real and only cause of the disease, operating independently, devastating the cleanly and most carefully-conducted nurseries no less than the most filthy and the most ill-conducted. The other diseases, on the other hand, are primarily caused by the vicious and filthy system of rearing in vogue among the natives, and only secondarily by the germs that are associated with them; and neither of them appears to be hereditary in the strict sense, though all are communicable from one worm to another, either directly, or indirectly, and are contractable from the germs which must necessarily exist in inconceivable numbers in houses—and in everything that those houses contain—where worms are reared year after year on the same trays, and the excreta of the living and the corpses of the dead worm with the *débris* of past meals are all allowed to accumulate until they form what can only be described as a dung-heap equal in thickness to the depth of the tray."

There can be no doubt that the only remedies are the segregation and destruction of the diseased insects and the promotion of nurseries for supplying good 'seed' to the cultivators. This can only be accomplished by skilled European aid, and it is hopeful to know that Government and certain gentlemen interested in the silk-industry have joined to procure the services of an expert for the examination of the home-raised 'seed,' and if these be found unfit, other seed will be imported. There can be no doubt that much may be done by the introduction of cheap and easily procured appliances to improve the existing rude processes, and above all insisting on greater cleanliness in the rearing houses than in most cases now obtains. Where disease is known to exist the entire frames, *débris*, dead worms, and leaf refuse should be burned, and the location of the frames, if possible, changed. The leaving of even a few infected worms in a school will soon leaven the whole lump, and the operation will soon have to be repeated.

WHEAT CROP, BOMBAY PRESIDENCY.

The second report on the wheat crop in the Bombay Presidency which is for the period ending 20th February 1887, is as follows :—

"*Guzerat* area about 375,000 acres :—Ahmedabad 200,000 acres, Broach 100,000 acres; rest scattered. Injury from frost and rust reported from parts of every district; estimated yield in chief wheat tracts is 5 annas in Broach, 9½ annas in Ahmedabad, and 8 annas in Surat and Kaira.

"*Deccan* area about 1,050,000 acres :—Khandesh and Nasik have 300,000 acres each, Ahmednuggar 225,000 acres, Poona 100,000 acres, Sholapore and Satara 1,25,000 acres between them. Rust partly resulting from cold reported generally prevalent; irrigated wheat more affected than dry in north and just the contrary in south; also slight injury from rats in parts of Sholapore. Yield will be below average almost everywhere.

"*Carnatic* area about 575,000 acres :—Dharwar 300,000 acres, Bijapore 175,000 acres and Belgaum 100,000 acres. Here also rust is prevalent especially in black soil and river-bank villages; slight injury from rats in parts of Bijapore. Yield everywhere below average.

'*Sindh* area about 250,000 acres, of which over half is in Shikarpore alone. In spite of injury from frost, the crop is reported to be average in Upper Sindh Frontier and Thar and Parkar; in Shikarpore the crop is promising.

"*Native States* area about 700,000 acres :—Kathiawar 300,000 acres, Baroda 100,000 and the rest mostly in Guzerat and Southern Mahratta States. Condition generally similar to that in the neighbouring British districts."

WHEAT AND LINSEED CROPS, CENTRAL PROVINCES, 1886-87.

...d report on the prospects of the wheat and linseed crops in the Central Provinces is as follows :—

The monsoon of 1886 was characterized by a very long break in August and September which ruined a large proportion of the rice crop and made the prospects of the *rabi* sowings look at one time very precarious. A considerable area of linseed was sown much earlier than usual, as the wheather towards the end of September seemed to have settled fine, and people were anxious to avail themselves as far as possible of what moisture remained in the ground. With the commencement of October, however, rainy weather set in throughout the provinces, and in some places quite exceptionally heavy falls occurred. In Nagpore no less than 9 inches were registered during the month of October. This secured the prospects of the *rabi* sowings, but did an immense amount of damage to the considerable area on which linseed and wheat had been previously sown. In the Nagpore and Wardha districts a large

proportion of this area was ploughed up and sown with wheat, and in Raipore and Bilaspore an extensive area had to be twice sown with wheat, the earlier sowings having failed altogether. During November and the first half of December the weather remained tolerably clear, but in the middle of December a fall of rain occurred which was especially heavy in the western portion of the Nerbudda Valley. Nimar received close upon four inches. A good deal of rain fell again during the first half of January, and at the end of that month and in the beginning of February frosts occurred in the northern districts which are reported to have done some damage. The rain fall of the monsoon had been over a large area of the provinces so short, that had cold weather rains not occurred, the crops must have suffered from lack of moisture, and there is little room for doubt that the rainfall of December and January greatly benefited the wheat, although in some places and principally in the Nimar district, it induced an attack of rust which did great damage. A fair wheat crop may be expected, and it is thought that in same cases the 'anna estimates' would have been higher than they are, were it not that 16 annas is popularly considered to express a full and not an average crop. The wheat harvest will probably be an exceptionally good one over a large portion of the Nagpore and Wardha districts. The linseed crop on the other hand is in the northern districts very little better than it was last year, when it was almost a total failure. Rust has against attacked it, due it would seem, principally to the fall of rain which occurred in the middle of December, as in the south of the Provinces and in Chhattisgurh where comparatively little rain fell from a half to a two-thirds crop is expected.

Under the orders of Government some general information is to be given in these forecasts regarding the prospects of food crop other than those to which the forecasts relate. In the districts of Chanda, Bhundara, Balaghat, Raipore and Bilaspore the rice crop is of very great importance and rice is largely consumed by the people It has already been mentioned that owing to the lack of rain in August and September rice suffered severely. In the three districts first named the crop was not on a liberal estimate more than a half crop, while in Raipore and Bilaspore it gave an outturn of only 2 annas in the rupee or even less than this over a very large portion of the country. The price of rice is consequently very high.

Over the rest of the provinces millets are the food crop next in importance to wheat and, though, in some of the more hilly tracts, these suffered from the scantiness of the rainfall, speaking generally a fair crop was gathered. The *juari* crop of Wardha and of the Berars was an exceptionally good one.

The area under wheat is estimated at over four million acres, and that under linseed at something over one million acres, only in two districts does the area under wheat fall short of the preceding year; in all others it exceeds it; in four districts by 20 per cent, while the area under linseed falls short of the previous year in eight districts.

INDIAN WHEAT CROP, 1886-87.

The second reports for the season of 1886 87 have now been received, and the following particulars regarding the present condition and prospects of the current wheat crop are published for general information :—

In the Punjab, the area under wheat at the end of January was estimated at 6,900,000 acres, as against the December estimate of 6,857,000 acres. In the districts near the Himalayas, there has been good rain but none in other tracts. Later reports indicate that crop prospects are at present unfavourable owing to the absence of rain which is urgently needed generally throughout the province.

In the North-Western Provinces and Oudh, for which the report received is up to 22nd February, the regular winter rains did not set in till the 4th January when the showers that fell during that month were plentiful and greatly benefited the crop. Fungoid disease which a[illegible]d the wheat was, however, caused by the appearance of cloudy weather, and in February the early crops on outlying unwatered lands suffered severely from frost. Taking 100 to denote a full average crop, the condition of the wheat in the United Provinces in February was 75. From other sources it is learnt that the *rabi* crops are in excellent condition everywhere, and that harvest operations have begun in some places.

The rainfall of December and January has greatly improved the wheat crop in the Central Provinces, where, however, in some places, and principally in the Nimar district, it induced an attack of rust which did great damage. A fair wheat crop is anticipated, and the harvest will probably be an exceptionally good one over a large portion of the Nagpore and Wardha districts. The area placed under wheat in the Damoh, Jubbulpore Seoni, Nimar, Wardha, Nagpore, Bhundara, Balaghat, Raipore and Bilaspore districts is in excess of last season's area, and the estimated [illegible] in annas per rupee, taking 16 annas to represent an average crop, varies from 10 annas to 16 annas in all districts from which reports have been received. From later reports it is gathered that the harvest has commenced in the Seoni, Hoshangabad, Khundwa, Raipore and Bilaspore districts. The area under wheat is estimated at over four million acres.

The total area placed under wheat in the Bombay Presidency, for which the report is up to the 20th February, amounts to 2,950,000 acres distributed as follows :—

	Acres.
Guzerat	375 000
Deccan	1,050,000
Karnatic	575,000
Sind	250 000
Native States	700 000
TOTAL ...	2,950,000

In Guzerat, injury from frost and rust has been reported from parts of every district. The estimated yield in the chief wheat tracts is 5 annas in Broach, 9½ in Ahmedabad, and 8 in Surat and Kaira. In the Deccan, rust, partly due to cold, has been reported to be generally prevalent and the yield will, it is expected, be below the average almost everywhere. Rust is also stated to be prevalent in the Karnatic, especially in black soil and river-bank villages. As in the Deccan, the yield is below the average everywhere. In Sind, notwithstanding the injury caused by frost, the crop is reported to be average in the Upper Sind Frontier and in Thar and Parkar, and promising in Shikarpore, which represents more than half the total area under wheat in Sind. In the Native States the condition of the crop is generally similar to that in the neighbouring British districts.

In Berar, the area under wheat as ascertained in the middle of February was 15 per cent above the average which is 807,000 acres. The crop is being gathered, and a yield of from 22 to 14 annas is anticipated.

A report recently received from Rajpootana estimates the area under wheat cultivation in 1886 in eight States to be 951,990 acres, but complete statistics for the whole Agency are not yet available. So far, however, as can be gathered from other sources, the prospects of the wheat crop both in Rajpootana and Central India are on the whole favourable, though in both Agencies some injury has been caused by frost.

In Hyderabad and Mysore the prospects and condition of the wheat crop are generally satisfactory

The general condition of other food-grains and non-edible food crops continues favourable. In Bombay, the rice and gram crops are being harvested, and in Berar the outturn of the staple food crop, *jowari* (great millet), was an average one. In Bengal, the winter rice has yielded well. In the Central Provinces some distress has been felt by the people owing to the failure of the rice crop. Rice is largely consumed by them in the districts of Chanda, Bhundara, Balaghat, Raipore, and Bilaspore, and the crop owing to the lack of rain was not more than a half crop in the three districts first named, while in Raipore and Bilaspore it gave an outturn of only 2 annas in the rupee or even less over a very large portion of the country. On the other hand, millets, which are in the Central Provinces the food crop next in importance to wheat, have, speaking generally, yielded a fair crop. The food crops of the people which have been principally affected in the North-Western Provinces and Oudh are *arhar dhal*, gram and peas. Fully half of the first and much of the other two have been destroyed by frost. In other parts of the country, so far as is known up to date, the condition of the food crops other than wheat is satisfactory, and there is no reason at present to apprehend any diminution in the proportion of the wheat harvest available for exportation.

The supposed normal wheat area of each province is quoted below : —

Punjab	7,000,000
North Western Provinces and Oudh ...	5,037,000
Central Provinces	4,000 000
Bombay (including Baroda)	1,883,000*
Berar	807,000
Bengal (Behar)	850,000
Rajpootana	2,500,000
Central India	2,500,000
Hyderabad	750,000
Mysore	20,000
Cashmere	500,000
Total ...	25,847,000

* Inclusive of Baroda but exclusive of the other Native States under the Political control of the Government of Bombay.

AGRICULTURAL BANKS FOR INDIA.

A—1.

THE subject of Agricultural Banks for India has been discussed in these columns before, but it has not commended itself to the authorities, or in fact to business men generally ; but the following paper, which was submitted to the Government of the North-Western Provinces and Oudh so far back as 1883, (at a time when the question was discussed by Sir E. Baring) by Lala Brij Nath, then Moonsiff at Meerut, and at present Chief Justice at Indore, will be read with interest. The paper was,

we believe, well received by Government, though it is not so certain whether any action was taken upon it :—

The agricultural classes of these parts have usually running accounts with some money-lender, either of their own or the adjoining village, taking from him advances for food, seed, bullocks, and implements of husbandry in the months preceding the harvest, when they are earning nothing, and handing over to him that portion of their produce which is not required for present wants, and from which the money lender pays their rent or revenue and credits them with the balance. Such accounts often run on amicably from year to year, and sometimes from father to son, till the clients having gone over to another house of business or having failed to pay their *mahajan* at the harvest, drive the latter to have recourse to law. Nine-tenths of the agricultural classes have such dealings, and the exception is only in the case of those who have come to own zemindari lands as a result of money-leading business or who hold large properties or are otherwise well off. The rate of interest for such transactions varies from 12 to as much as 75 per cent per annum according to the client's security, and considering that the items are small and numerous often coming down to a few annas, and that the tenant classes of the North West Provinces have but little to offer to the money-lender in the way of security except the surplus produce of their fields, the highest rate mentioned above is sometimes if not often willingly accepted. Bonds or other documents of sale or mortgage are executed by landholders or tenants only when the claims of pressing creditors or a social need like a wedding or Government demand when crops have failed compel the executant to go to the money-lender. Besides this, bonds are also taken in cases where the money due has become comparatively heavy or remained unliquidated for a number of years. Here also the rate of interest varies from 9 per cent to 36 per cent supplemented now and then with provisions as to compound interest according to the nature of the security and means of payment. These rates are assented to without demur, and it is only when the creditor takes undue advantage of the debtor's poverty, ignorance or helplessness, and claims a sum of money either more than due, or disproportioned to the amount of the original debt or the debtor's means of payment, that the latter also resorts to shifts in denying the debt altogether, if it is unsecured by a registered instrument, or plead satisfaction or part payment or excessive interest. This is not the practice of the more well-to-do and honest money-lenders who resort to the courts unwillingly and who, when they do resort, are often met with an admission of their claim, or compromise to it. On the contrary it is the foreign adventurer—a product, in the words of the Famine Commission, of a diseased condition of the community—who in his eagerness to become rich takes every advantage, due and undue, of the ryot's ignorance and poverty, exacts from him the highest possible interest and by resorting to so much friction in recovering a debt howsoever small is the cause of so much misery and complaint. The proposed establishment of agricultural banks would therefore prove a boon to that larger class of petty landholders and tenants who though being ground down by the usurers' oppression could not do without him. But in order to make the boon effective it is necessary that amongst others some of the principles mentioned in the following paragraphs be accepted by those who have the management of such institutions.

In the first place no limit should be placed on the way in which money is lent, as the ryot could not do without keeping running accounts, the bank may in its discretion keep such accounts with any ryot it thinks proper. To discourage accounts would be driving him to the money-lender for petty and always necessary items, and to resort to the bank for comparatively large amounts, thus bringing him under the necessity of serving two masters, with the result which usually follows in such cases.

In the second place, wherever an agricultural bank is proposed to be opened, its business must, very rarely, if at all, be entrusted to Government agency. It must, as far as possible, be made over to private firms, the Government according to them the privileges proposed in return for their submitting to any conditions that may be imposed by it. The privileges mentioned in the speech of the Hon'ble Major Baring are liberal enough to induce many native firms to come forward and undertake such business. Such a bank, if registered under the Companies' Act and composed of a number of shareholders, would, in consequence of such exceptional advantages, soon rise into public confidence. Its shares would command fair value and it would be looked upon by the investing class as a safe bank. But for its increased popularity and usefulness, it is necessary that two of the checks mentioned by the Hon'ble Major Baring be relaxed, to suit local circumstances. The first of these checks is that the loans made be registered in a Government office. This is impossible in the case of small book debts, and if these were not held to fall within the province of the bank the result would be that mentioned above. I would, therefore, suggest this modification. All book debts are to be balanced periodically—say every year or half year, and the balance, if comparatively large, is to be merged into a bond or deed of hypothecation or mortgage, which is to be registered in a Government office, say the tehsil. This would serve both the objects aimed at; for on the one hand, it would prevent the accumulation of unsecured debts due to the bank, whilst on the other it would extend its sphere of usefulness, from those who require lump sums to that large class of tenants who find it to their convenience to keep

rate of interest to be

Now I

banks established under State patronage, without ... circumstances. For instance, in Bombay the cultivator has no landlord between himself and the Government, whilst in the N.-W. P. he has no transferable interest even in his occupancy rights,

The maximum of 12 per cent may, therefore, do for the former, whilst in the latter provinces it may not be sufficient to cover the risks undertaken by the bank or leave a fair profit to its shareholders. Such a maximum as would suit local circumstances should therefore be imposed, and in imposing it, regard must be paid to the usual rate of interest charged by ordinarily well-to-do *mahajans* from the agricultural classes. The rate of interest is not so much the cause of complaint amongst the agricultural classes as the dishonesty or irregularity in accounts kept by village *mahajans*. Those former are often willing and do pay as much as 24 per cent when they find that what they borrow and what they pay is regularly entered in their accounts. I shall give one instance. For some time past there has been in Meerut a registered bank, known as the "Meerut Instalment Company, Limited. This institution is managed by a few native gentlemen here, carries on business to the extent of about ten or fifteen thousand rupees, and usually charges interest at 2 per cent or it recovers 12 rupees for every Rs. 10 payable by instalments. But in spite of such high interest the bank, I am informed, enjoys the confidence of the agricultural classes and pays a dividend of 12 per cent to its shareholders. Such confidence is the result of its accounts being faithfully and properly kept.

As to how loans should run, I have already said that book debts should be balanced every year and the balances, if comparatively large, merged into bonds. These latter, if unsecured, could under the law run for 6 years at the utmost, unless they are payable by instalments. But I should say that the maximum period of law should not be allowed to run before a suit is brought, on the contrary an unsecured bond should be made the subject of a suit two years after its execution or the date fixed for payment at the utmost a hypothecation bond three years, or even sooner when the debtor's property appears to be insufficient to cover the sum due and a book debt one year.

What proportion of the money paid should be credited to principal and what interest depends upon the agreement of the parties or the interest due; under the contract Act, unless there is an agreement to the contrary, the payment may be applied towards the liquidation of any debt due. Now there would be no difficulty in cases where the amount of interest due being comparatively smaller than the amount paid and the debtor insists on having it credited to principal to credit it so, but where interest is equal to or more than the amount paid, it should be liquidated before crediting anything to principal.

Tenants in these parts have no moveable property which they could hypothecate or mortgage. Their cattle and implements of husbandry are already exempt from attachment under the law. What they could therefore pledge to the bank is jewellery and surplus live stock as in the case of those who breed horses, and there could be no harm in accepting pledges of these.

One of the checks, *viz.*, that relating to audit outside the bank at the latter's expense may be made more stringent by providing such audit by a Government officer. This would react beneficially on the bank also.

On the question of privileges, I would suggest a reduction of 2 per cent in court fees for suits brought by the bank. No reduction need be made in the duty leviable on bonds, as the present rate of 8 annas for every Rs. 100 is very fair, and is not felt at all by the people. If any reduction is necessary, it may be made in the shape of according to the bank the privilege of having registration registers to ascertain prior encumbrances searched free of cost.

Another privilege may be granted in the shape of an order to the tehsildars of each tehsil to enjoin *putwaris* and other village officials to assist the bank in its inquiries regarding the means of a proposed debtor.

In the third place, no restriction should be placed on the business of the bank, as to the purposes for which it could make advances. On the contrary, whilst freely advancing money for "agricultural improvements" as well as for purchase of seeds, bullocks, implements of husbandry, maintenance of the debtor's family when he is earning nothing, payment of rent or revenue, it should never hold its hand from lending money for social needs, such as marriages, &c. To do so would drive the ryot to have recourse to the money lender, thus bringing the bank into undesirable competition with him. Only in order not to encourage useless expenditure, the bank may enquire into what was absolutely necessary for such purposes for persons of the same position in life as the applicant.

In the fourth place, if a bank is desirous of placing itself in the position of a first mortgagee, it should only do so if it is satisfied that the property of the applicant was sufficient to pay off both its own and the former debts. Creditors who have an eye on the mortgaged property would, however, be unwilling to be paid off unless some penalty was attached to their declining or neglecting to be paid off. This could be done by a notice from the bank to the effect that those who declined or neglected to be paid off would not be entitled to interest after the date of such notice.

In the fifth place, the system ought to be extended to every province of India, only regard must be paid to local circumstances in regulating interest, guarding against losses, &c. For instance it could be extended to the N.-W. Provinces, and the highest interest in case of non-landholders, being say, 8 per cent which is much less than that charged by the *mahajans*, the tenant's crops, after paying the zemindars' demand, may be declared as being hypothecated for the bank's debt, as second mortgagee, so to speak. The advantages of that system are too obvious to need description. It would relieve the agricultural class not only from high rates of interest but dishonest accounts &c.

Closely allied to this subject is the amendment of the existing law regulating the mutual relations of the debtor and creditor. As I have said in this letter the agricultural class suffers as much from high rates of interest as from the payments not being

credited in the accounts. Now in order to remove this it would be a great boon to the agricultural community to extend the provisions of Sections 12 and 13, 15 and 16 and 64 to 67 of the Deccan Agriculturist's Relief Act to these provinces. This would give courts a positive rule of law instead of the broader and more indefinite one of justice, equity, and good conscience to in all cases fully enquire into the history of the debt to take separate accounts of principal and interest to credit the debtor with any money paid and to disallow any interest they think improper. To the debtor it would give the right to demand receipts for payment yearly statements of accounts and pass books in which the accounts are written up and attested by the money lender. It would, moreover, prevent the debtor from denying the debt or plead a payment not really made thus proving a source of benefit to both parties. Courts of law may also be enjoined to make a better use of their description in awarding interest after decree, so as not encourage decree holders to keep decrees hanging over the debtor's heads for indefinite periods.

THE CHRYSANTHEMUM.

THAT the chrysanthemum is gradually but surely becoming favorite with a large section of the horticultural public in this country there cannot be any doubt, and deservedly so, for we know of no plant that will more amply repay them for the attention bestowed upon it than this gay autumnal flower. The variety of colour, size and form, and also its suitableness for decoration make it the most useful of all flowers at a season of the year when there are so few other plants in bloom. As a class of plants the chrysanthemum furnishes great variety. The colours are, however, not so distinct as a great many people would like, but in this respect want of experience in selecting varieties of suitable colours for massing is often at the bottom of the dissatisfaction. As a matter of fact, it may be broadly stated that the bulk of chrysanthemum growers do not always make the most of their collections. They are very much treated as a whole, and follow each other in the order of nature as regards the time of flowering. An experienced grower will have no difficulty in keeping up a fair show from October to February, but it requires some little judgment and a knowledge of the habits and time of flowering of the different kinds under cultivation. No plants are easier to grow, but in scarcely one instance in a hundred do they receive the attention they require or that their merits deserve. The chrysanthemum will grow in almost any kind of soil and in nearly any locality, but to enable the cultivator to grow it to that perfection which it deserves, its habits and demands both of soil and locality must be carefully considered. Gardeners seldom agree on these points, some mixing their composts almost as carefully as a chemist compounds his drugs, while others pot them in anything that comes to hand: it is hardly necessary to say that those who follow the latter course are rarely successful growers. There are two or three points that should be borne in mind if success is to be attained in the culture of this plant. First, the selection of a proper compost. This should be good turfy loam, not too light, and it must be well enriched with old cow manure. Second, the cuttings must be taken early, say, by the end of January, or not later than the middle of February, and they should be strong and free from insect pests: weakly cuttings never make strong plants. Third, when the cuttings are properly established, see that the young plants are well exposed to the air. The plants must never be pot-bound, nor must they suffer from want of water at the roots at any period during their growth. Before, however, we proceed to consider the cultivation of the chrysanthemum, I must first describe the various sections into which they are now divided.

SECTION I.

The large incurved or Chinese large flowered.—These have the florets incurved and the tips meeting at the centre, the flowers forming in some instances almost a perfect ball. The petals also are broad and of good substance. This section is probably the most useful for cultivation in this country, withstanding the effects of our climate better than any other.

SECTION II.

The large anemone flowered.—This is composed of flowers quite as large as the incurved varieties; the edges of the flowers, however, are formed by a fringe of broad open florets, and the centre is composed of quilled florets closely arranged, and forming in a good variety almost a perfect hemisphere; and the nearer they approach this form, the more highly are they prized.

SECTION III.

The Japanese.—The Japanese chrysanthemums have given our beautiful autumnal queen quite a new interest, for before they made their appearance the raisers of the large flowered varieties had already reached the climax of perfection, so that when the Japanese varieties came upon the scene, attention with regard to improvement was immediately directed to them.

The original examples of these were quite different from what the majority of them are now. The florets being narrower and the flowers altogether much smaller than the best varieties now in cultivation, there is something in the wild aspect of these Japanese chrysanthemums that is admired by every body. I must confess a great partiality for these tassel flowered kinds, and it is to be hoped that in the endeavours to improve them as regards size and colour, their unsymmetrical form and tassel-like aspect may be preserved

SECTION IV.

The Pompon.—This is a comparatively new section that has not yet received the attention in this country that it deserves. The flowers of a true pompon are small, resembling double Daisies; in fact the original kind was called the Chusan Daisy. The flowers are most abundantly produced, as many as 1,400 having been counted on an exhibition plant growing on a single stem and raised from a cutting in one season. The plant in this section form dwarf bushes naturally.

SECTION V.

The anemone flowered Pompon.—This section is supposed to be the result of hybridising the varieties of the preceding with the large anemone flowered varieties. They differ, however, from the latter in having, in most instances, a double or treble fringe of outer florets. The centre florets should form a half sphere as in the other section.

SECTION VI.

Summer-Flowering Varieties.—This is an entirely new race, now very popular in Europe, but cannot be recommended for this country. Many of them commence flowering as early as August and September, just when our rainy season is in full swing, and for this reason can rarely be successfully grown.

SECTION VII.

Single Flowered.—The vagaries of Fashion seem also to have overtaken the chrysanthemum and the recently introduced single forms bid fair to become as popular as the single dahlia.

CULTIVATION IN POTS.

In speaking of their culture it is necessary to first refer to taking the cuttings, which should be done as soon as the new shoots are from one to three inches long. Select the strongest and healthiest shoots and put them into three-inch pots. Employ a compost of light fibrous loam, leaf mould and sand in equal quantities, in this mixture they will root freely. The object in stocking them singly in pots is to prevent them experiencing any check to their growth when put in larger pots. As soon as the cuttings are potted off, they should be placed in a cool shady position, carefully protected from the sun's rays for about a week, when more light may gradually be given them. After a month they will generally be found to be well rooted, when they will be ready for their first shifts, which should be in 4-inch or 4½ inch pots. After repotting the young plants should be returned to a shady position, and watered very sparingly for the first few days. As soon as these pots are well-filled with roots they will require another shift which on this occasion should be with six inch pots, and the compost employed should consist of two parts good turfy loam, one part good rotten manure and leaf mould, and sufficient coarse sand to keep the whole porous; a good sprinkling of soots or powdered charcoal may be added with advantage. The compost should be used in a moderately lumpy state, and care should be taken to see that it is free from worms. After re-potting they will require the support of small stakes to prevent their being injured by wind or heavy rains.

Particular attention should be paid to them at this stage to keep them free from green fly, for as a rule this pest attacks them most severely just at the time they are making their most vigorous growth. The best means I know of for keeping green-fly in check, is to well dust the foliage with tobacco powder and then give the plants a good syringing an hour or two after; syringing the plants every evening during dry weather is strongly recommended, as this will materially assist in keeping the foliage clean, and in maintaining the plants in good health. Care must, however, be taken to guard against their being over-watered when newly potted, but they must be supplied most liberally as soon as the pots are well filled with roots. Pure water is the best liquid for chrysanthemums until they begin to show signs of flower buds. This is a point, however, on which there is much diversity of opinion, a form of stumbling block that causes more failures probably than any other. The chrysanthemum is well-known to be what is termed a gross feeder, that is, it will digest almost any kind of plant food that comes in its way, but that is no reason why we should encourage this voracious appetite, and thereby cause an unnaturally vigorous growth of foliage, in most instances, thereby sacrificing a good crop of flowers. What we want is strong, vigorous, short-jointed well ripened wood, and this we may always obtain provided we give our plants a suitable compost to grow in, a plentiful supply of pure water when they require it, and keep them clear of all insect pests.

We next come to the question of shifting them into their blooming pots. This operation should be performed at intervals from the end of June to the commencement of September, as by so doing the blooming season may be materially prolonged. Nine or ten inch pots should be used, and these must be efficiently drained and have a layer of the rougher portions of the compost placed over the crocks to keep the soil from mixing with them, as bad drainage is very injurious to the health of the plants. The compost used for the final shift is the same as that employed at the previous potting. As soon as they are placed in their blooming pots they should be arranged in a light airy situation where they may enjoy the full benefit of the morning sun, but somewhat protected from the extreme heat at mid-day. The pots should be placed on a layer of slates or tiles or a bed of coal ashes to prevent worms finding their way into them. It will also be necessary to give them larger stakes. By the end of July most of the plants will commence to branch freely, and four or five of the strongest on each stem should be left for blooming. As soon as the flower buds begin to develop, we may commence to feed the plant liberally, for we may rest assured that whatever stimulant is now given it will tend to develop the blooming qualities of the plants and not in the production of foliage only.

RUS IN URBE.

Selections.

A CORRESPONDENT directs attention to the Agricultural Exhibition to be held in Belgium next year. This will be international in its character so far as it relates to agricultural machinery.

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 15th of February was 147,704,060 lbs., as against 146,778,240 lbs. in the corresponding period of last season. The exports to the United States and Canada during the same period were 87,852,572 lbs., as against 78,775,510lbs.

It is announced that an extensive plantation of olive trees is to be established in Soleno County, California. The growing of olives and the manufacture of oil have already passed beyond the experimental stage. In San Diego and Santa Barbara counties, in particular, olives have been grown for several years at a very handsome profit, while the California olive oil is noted for its excellent quality and freedom from adulteration.

NEVADA, the great silver-producing country, is promising a great output of nickel. There are twenty five nickel mines all more or less developed, and experts assert that no greater ore body, in magnitude or value, has ever yet been found, even in Sweden, Norway, Hungary or Caledonia, the most noted producers of this valuable metal. Already more than 700,000 tons of ore are visible, of an average assay of 8·57 per cent nickel, from 1·53 to 4·79 per cent cobalt.

A NEW metal, called by the inventor, Alvert Assam of Rahway, New Jersey, "Assayme," is produced by a special treatment of tin. It has all the good qualities of the latter, can be pressed into any shape or cast into statuary, or used for plaited ware of any description. A beautiful bronze colour can be given to the metal, or any shade from bronze to a silver colour; and as it does not in the least corrode, it is specially valuable as a silver solder. It melts at a temperature of 432 deg. or 18 deg. less than tin.

A USEFUL alloy of aluminium and tin has been obtained by M. Bourbouze, by melting together 100 parts of the former metal with ten parts of the latter. This alloy is whiter than aluminium, and has a density of 2·85, a little greater than that of the pure metal, so that it is not too heavy to replace aluminium in instruments requiring great lightness of their parts. It is less affected by re-agents, &c., than is aluminium, and also is more easily worked. Another of its merits is that it can be soldered as easily as brass without any special preparation.

AT a recent meeting of the Shiyali public, among others, the following resolutions were carried *nem. con.*—"That in a purely agricultural district like Tanjore, the establishment of an agricultural school, *i.e.*, an institution where knowledge from books is supplemented by practical working in a farm would be more useful and necessary than the founding of an industrial college; that it should be brought to the notice of the President of the Tanjore Central Committee that in the event of such an agricultural institution being established near Shiyali—he (Mr. Sabanayagam Moodelliar) would endow it with a donation of Rs. 1,000, and with a subscription of Rs. 500 per year by way of scholarships to the students—tenable for 5 years. 20 acres of land from his own estate for opening a farm he would also place at the disposal of Government. This was seconded by Mr. Vadamalai Pillai, who said that he would, in the same circumstances, make a donation of Rs. 500 and subscribe Rs. 300 yearly for scholarships tenable for one year."

IN our last impression, says the *Deccan Times*, we made mention of the Hyderabad Company having commenced prospecting for diamonds in the vicinity of the once famous mines of Partial. This locality, which is commonly, though erroneously, supposed, to have enjoyed the honour of having produced the great Mogul or Koh-i-Noor diamond, appears under so many different names that it may be best to mention some of them in order to remove any possible confusion; they are Shni Partal or Partal and Gani Parteala or Partenla, &c. Although it has been disputed, it seems not improbable that the Pitt or Regent diamond was found in some of these mines of the valley of the Kistna. It would seem that, when the Nizam ceded the Northern Circars to the British he was permitted to retain possession of all the village lands of the area in which the diamond mines were situated, and these villages now stand isolated in the British Kistna and Godaveri districts. The revenue derived from them by his Highness the Nizam at present, from ordinary agricultural resources is not inconsiderable, but the diamond mines yield little or nothing. About the beginning of the 15th century, they belonged we believe to a powerful zemindar called Ooparow but on his discovering the diamonds, they were taken possession of by his soverign, the Nizam. As many of the mines were hollowed down to the rock, it was concluded that the tract was exhausted, but this is scarcely probable as the stratum in some cases extends under the villages where, from superstitious motives, it has not been touched.

MAURITIUS SUGAR IN INDIA.

THE Mauritius Government directs the publication, for general information, of the following documents relative to the sale of Mauritius sugar in India:

Chamber of Agriculture, Mauritius, March 18th, 1886.

To His Excellency Sir John Pope Hennessy, K.C.M.G.

I have the honour to inform you that the several documents relative to the sale of Mauritius sugar in India, which your Excellency was pleased to authorise the Hon'ble Colonial Secretary to send to me have been communicated to the Chamber of Agriculture, and that these documents have been returned to the Colonial Secretary's Office.

I am desired by the Chamber to express its acknowledgments of your Excellency's readiness to meet the views of the Chamber in respect to this question, and at the same time to submit to your Excellency's favourable consideration some observations, suggested by the letter from the Government of India.

The Chamber has seen with regret, by the letter of 8th October last, from the Under-Secretary to the Government of India, that the Governor-General in Council did not consider it expedient that any such action should be taken as was asked by the Government of Mauritius, in order to bring it as widely as possible to the knowledge of the native population that Mauritius sugar is not manufactured by processes repugnant to their religious sentiments.

The letter No, 2143 ZR, dated 3rd November, 1885, of Mr. W. C. Macpherson, Offg UnderSecretary of the Government of Bengal, to the Colonial Secretary of Mauritius, contains a paragraph (2) which runs thus: "I am to add that the suggestion contained in the pamphlet. that Indian refined sugar contains animal matter and therefore offends the prejudices of the Hindus has been objected to by manufacturers of sugar in India as being incorrect."

This naturally excited the attention of the Chamber, but it has been at a loss to see how any of the manufacturers should have thought that in the pamphlet of Mr. W. Newton referred to, there was any suggestion of the employment of objectionable matter in India; no such suggestions was intended, which it trusts will be made evident by the following copy, and literal translation into English, of the only paragraph in that pamphlet which mentions the use of animal charcoal:

[Translation.]

"Moreover, we must above all direct our view to the market of "India. The peculiar requirements of that market with which you "are all acquainted offer us there a decided advantage. All the "natives of India, however, do not know that we do not use "animal charcoal in the manufacture of our sugar. We must "dispel all doubts which may still exist in the minds of many of "them, etc."

The Chamber would submit that there is not in this paragraph one single word which could imply the idea that animal matter is used for the refining of sugar in India.

As regards the manufacture of sugar in Mauritius the Chamber can state, as a matter of fact, that these substances only, *viz.* lime, sulphurous acid, and phosphoric acid are used by the planters of Mauritius for the purifying, clarifying, and discolouring of cane-juice. These three agents, as used here are obtained exclusively from mineral substances, and cannot therefore be repugnant to the religious feelings of the Hindus.

The Chamber will not dwell on these points, but begs to refer to the fact that your Excellency's enquiries led you to declare publicly here, and to inform the Government of India, that "no animal charcoal nor other such substances are used in the factories of Mauritius." It might have been enough to say that the planters of Mauritius are too much convinced of the importance to them of the Indian market to admit any new process which would require the use of animal matter.

The Chamber may be allowed to remind your Excellency that when last year it recommended that a premium should be offered by the Colony for any process to improve our manufacture of sugar it stated, as a condition *sine quâ non* that on account of the conditions necessary for the sale of our sugar in the Indian markets, no process implying the use of animal matter would be taken into consideration. The Chamber would respectfully beg that your Excellency may be pleased to forward a coppy of the present letter to the Government of India, and take such other steps as to your Excellency may seem fitting, and also to authorize the Chamber to publish this correspondence in India in the most authen tic shape.

(Sd.) V. BOULLE.

Mauritius, Port Louis, 28th December 1886.

The President of the Chamber of Agriculture.

Sir,—We beg to inform you that letters from some of our countrymen in India have lately reached our firms, stating that in certain parts of India the inhabitants refuse to buy Mauritius sugars, because it has been said to them that they were manufactured with animal charcoal, that is, animal bones and blood.

We are all aware here how Mauritius sugars are manufactured, and we know that they do not contain any substance re-

pugnant to the religious creeds and sentiments of the Hindoos. We do not therefore hesitate to say that the rumour which some persons have had interest to circulate in India is a false, malicious and erroneous one, calculated to prejudice the products of Mauritius

We therefore beg the Chamber of Agriculture to have the same authoritatively contradicted.

Your most obedient Servants,

(Signed) Hajee Jonus Allarackia,
— Hajee Sabee Sidick & Co,
— Hajee Salay Mamode Purtha,
and many others.

(*Certificate*)

* * * *

We, as Mahomedan priests, do hereby declare that it is to our personal knowledge that the sugars manufactured in this Island of Mauritius, do not contain any substance which might affect the religious feelings of the Hindoos—and we do further declare that these sugars can be, without the least fear, consumed by all those who profess the same religion as ourselves.

(Signed) Imam Hajee Mahomed Taleb, *Bishop of the Mahomedans of Mauritius*.
— Sheik M homed Mudan, priest,
— Peer Jangeer Meeah Saib.

January 14, 1887.

The good people of Mauritius are still in a great state of excitement about the reports that have been circulated in India regarding the alleged introduction of animal matter into Mauritius sugar The report is a false one from first to last and from the industrious way in which it has been circulated, would almost seem to have emanated from some of the sugar-makers on the other side of India, who wished to stir up a caste prejudice against Mauritius sugar The Chamber of Commerce in Port Louis, believing that these reports may prove very injurious to their trade, have asked us to give them the most public contradiction, and have supplied us with all the documents on the subject The Chamber of Agriculture, in a memorial addressed to Sir Pope Hennessey in March last, point out that the reports circulated in India seem to have been in the first instance, a very prompt retort to reports regarding Indian sugar which were erroneously said to have originated in Mauritius. A letter dated 3rd November, 1885, of Mr. W. C. Macpherson, Officiating Under-Secretary to the Government of Bengal, to the Colonial Secretary of Mauritius contains a paragraph (2) which runs thus "I am to add that the suggestion contained in the pamphlet, that Indian refined sugar contains animal matter and, therefore, offends the prejudices of the Hindoos, has been objected to by manufactures of sugar in India as being incorrect." For this reason, it is alleged, the Governor-General in Council did not think it necessary to publish the official contradiction with which he had been furnished. But no such suggestion was made in the pamphlet. The only passage mentioning animal charcoal runs.—"Seulement les Indi ns ne savant pass *tous* que nous n'employons pas de noir animal dans la fabrication de notre sucle. Il faudrait dissiper les doutes que existent encore dans l'esprit de bon nombre d'entre eux. . ." This seems to have been mistranslated in India and in the way Mr. Macpherson was probably deceived. The translation should be: "*All* the natives of India, however, do not know that we do not use animal charcoal in the manufacture of our sugar. We must dispel all doubts which may still exist in the minds of many of them. . . . &c." Only three substances are used in the Mauritius in the manufacture of sugar, viz., lime, sulphurous, acid and phosphoric acid for the purifying, clarifying and discolouring of cane juice. These three agents are obtained exclusively from mineral substances, and cannot, therefore, be repugnant to the religious feelings of the Hindoos. The importers on this side are equally interested with the planters and manufacturers on the other side, and they have drawn up a document declaring that Mauritius sugars do not contain any substance repugnant to the religious creeds and sentiments of the Hindoos. "We do not" they continue, "therefore, hesitate to say that the rumour which some persons have had interest to circulate in India is a false, malicious, and erroneous one, calculated to prejudice the products of Mauritius." This document is signed by Hajee Jonus Allarakia, Hajee Sabu Sedick and Co, Hajee Salay Mamode Purtha, Ally Mamode Hajee Salay Mamode and Co., Hajee Jackaria Hajee Ahmed, Vieram Ebrahim and Co., A. G. Ossen, Isop Mde Sulliman, H C. Mamoojee, Suleman Elias, Essa Abboo, Hajee Sulliman Hassam, Ally Thay Damood, Esmael Purmamod and Co., Essack Hajee Abdool Sathar, Essack Allarakia, H. J. Mamode, H. J Mamod, H. Haroon Tyeb, Hossen Cassim, and Hajee Sally Mahamode Mousa; that is by all the leading representatives of the trade. It is supported by another document, signed by the Bishop of the Mahomedans of Mauritus and the principal priests to the effect that "to their personal knowledge the sugars manufactured in this Island of Mauritius, do not contain any substance which might affect the religious feelings of the Hindoos, and they further declare that these sugars can be without the least fear, consumed by all those who profess the same religion as themselves." This is strong evidence and now that it has been brought to their notice the Government of India would do well to circulate it as widely as possible among the native consumers. The sugar trade with the Mauritus is chiefly carried on with Bombay capital, It is increasing and capable of large developments, and the Bombay Government, as apart from the Government of India, have already issued a notice warning the people generally not to believe any *canards* that may be put about by interested persons. They all, however, seem to originate on the other side of India.—*Times of India.*

WILLOW GROWING.

AFTER MANAGEMENT OF THE CROP —In the case of a willow crop, few things, after careful preparation of the ground and timely planting, contribute more to the setting up of a good crop of rods than keeping the ground in a sweet, healthy state by removal of all weeds two or three times at least during each season. Hoeing is preferable to any other system of cleaning, but it may occasionally be found necessary, particularly where bindweeds or other running rooted plants are in the soil, to have recourse to the more tedious but surer method of hand weeding. We have noticed on various occasions the marked difference between the yield of osiers on clean, well-managed ground, and such as is allowed, under the false pretence of saving expense, to become matted with weeds. Not only is the yield better under a proper system of management, but the rods individually are cleaner, straighter, and in every way better adapted for the use of the basket maker.

The crop of willows may be cut immediately after the fall of the leaf in autumn, tied in bundles and put standing with the thick ends in water of 2 or 3 inches deep; that is, if not disposed of and carted away at the time of cutting. In cutting the rods, sever them from the root-stem as close as can conveniently be done, for much injury is not unfrequently entailed on the succeeding corp by allowing the decaying wood to remain intact. A good standard is to cut the rods back to within three quarters of an inch of the old wood, as by so doing just sufficient eyes or buds are left for producing the crop of the following season; and it is always preferable and more profitable to have a few long and strong rods, than a number of short, thin, and weak ones After cutting the crop and before the shoots starts fully into growth in spring, it may be well, and will save considerable time and trouble hereafter, to have the ground thoroughly cleaned by hoeing and raking the accumulations of weeds and other surface rubbish that is consequent on the gathering of the crop: another advantage, apart from cutting over the weeds in a young state, is that by making an early start at cleaning less damage to the young and tender shoots of the willow is likely to be inflicted, than when the work is differed till later in the season.

PROFITS OF WILLOW CULTURE.

That willow culture was at one time, and that not a quarter of century ago a profitable occupation is beyond doubt, but like corn and wheat the profit of this crop have of late years greatly diminished, this being wholly due to the cheap rate at which foreign rods can be sent into our English markets. It may seem somewhat surprising but it is nevertheless a fact that France and other Continental nations can deliver their osiers in the London market at a cheaper rate than growers of the same commodity can from some of the midland English counties; and owing entirely to this state of matter many of our largest and most successful cultivators have given up the trade in disgust. As will be shown hereafter, it is now almost an impossibility to make over £5 per acre from osier culture, even though it be carried out economically and on the most approved principles, whereas not a dozen years since nearly double the amount named was considered as about a fair average of the prices realised.

The following figures are not the results of a single experiment, but that of no less than three, carried out in various parts of the country, and by those practically acquainted with the work; so that they may be relied upon as forming a good basis, approximately, of the expenses and profits in connection with the cultivation of osiers for basket making:—

Cost of Forming Osier bed per Acre.

Preparation of ground, including draining, ploughing and weeding	£11	0	0
25,000 sets, at 12s. per 1000	15	0	0
Planting sets at 3s. per 1,000...	3	15	0
	£29	15	0

Yearly Expenses.

Interest of money invested at 5 per cent.	£1	10	0
Rent of ground	0	12	0
Repairing fences, and making up gaps in Osier bed	1	0	0
Weeding, &c.	1	10	0
Cutting the rods	1	8	0
	£6	0	0

Yearly Value of Crop.

180 bundles of rods at 1s. 2d.	£10	10	0
Expenses	6	0	0
Net profit	£4	10	0

Of course it must be borne in mind that as prices of labour vary considerably in different districts, so, in proportion, will vary the cost of forming and managing an Osier bed. I have known, in the North of Ireland, where labour is cheap, Osier beds formed for nearly one-half the above-named cost; but it is likewise well to remember that the formation of these beds, as well, indeed, as the subsequent management, was only second rate as compared to our best English systems, and the profits derived from them proportionately small.

The above produce of an acre of ground may seem small, and it may be well to state that in addition to the 180 bundles mentioned there are usually several loads of small and inferior stuff for which, in certain localities, a ready market may be found at a merely nominal rate; but in most parts of the country this refuse, as it is usually called, is hardly worth the trouble of loading and delivering to a much greater distance than 4 or 5 miles from where the rods are produced.

Willow culture is, therefore, even under the most advantageous circumstances, a speculation not to be entered into largely at present, and, as will be seen from the following letter, written but a short time ago by one of our largest Willow growers, Mr. Scaling of Basford, Notts, has been gradually on the decline in this country for some time:—"I am sorry to say that since my report to the Highland and Agricultural Society was written, Osier cultivation has ceased to pay, from the same causes that wheat growing has ceased to pay, viz., foreign imports, aided by railway preferential rates, which enables any French, Belgian, or Dutch grower to deliver this produce into the large inland towns of England at a lower rate per ton than a grower can from the centre of the railway system; indeed, I would not, under the disadvantages we are placed, advise any one to plant Osiers." A. D WEBSTER in *Gardeners' Chronicle.*

SIR WILLIAM ARMSTRONG'S SILOS.

PROFESSOR WRIGHTSON, of the Downton Agricultural College, communicates to a contemparary an interesting account of the silos on the home farm of Sir William Armstrong, who, "in the quieter years of a strangely active life," is "turning to agriculture with all the zest of youth, and bringing to bear upon it at least two of the great subjects which occupied his earlier manhood." The silos, it appears, are situated on ground gently falling to the Cognet, and backed by hills which give unexpectional facilities for the adoption of water-power. They form a pair of exceedingly substantial stone-built chambers, cemented, drained, and roofed. They occupy a rectangular space about 75 feet long by 17 feet wide, and are composed of two silos of 29 feet 6 inches by 14 feet each in area, separated by a central tower 14 feet by 14 feet. All these chambers are carried 21 feet beneath, and the central tower rises 17 feet above the level of the ground The roofs of the silos on either side spring at the height of 11 feet from the ground. There is not much to remark as to the silos themselves. They are, the Professor states, rectangular, deep, and smooth-sided, and communicated, by means of upper and lower doors, with the central tower, which parts them The chief interest centres around the means of filling and weighting the silage, both of which operations are managed from the central tower by water power. Sir William has made use of the natural advantages of the situation. The hills offer many exceptional means for collecting a head, or heads, of water, and he has by deflecting streams and forming artificial lakes, utiliz d these advantages to the full. The water is brought by means of iron piping, and is made to actuate a turbine and hydraulic ram, the first with the object of turning a powerful chaff-cutter for chopping up the fodder crops about to be ensiled and the second to regulate the amount of pressure upon the surface of the newly filled silos. In the roof of and overhanging each silo are three parallel strong trussed iron girders, from each of which like bells in a belfrey, hang six stone weights of 25 cwt. each, dividing the total length of each girder into as many parts, and covering the entire space below by 18 massive cheese-shaped weights, all held securely by iron rings and clamps. Each or all of these weights can be immediately lowered upon the silage and as rapidly lifted up to their position in the roof by means of the hydraulic ram in the basement, hence giving without difficulty the two desiderata of continuous and sectional pressure. Without entering into details as to the manner in which this is effected, it will suffice to say that the weights are under perfect control and can be all rapidly raised and lowered by one man, and a boy to work the lever, allowing the entrance and escape of the water. The result is described as "perfect." The initial expense must, Professor Wrightson adds, have been considerable; but the work is permanent, and the current or constant expenses are reduced to a minimum. Sir William we are moreover told, speaks highly of ensilage as a food, and his men are equally enthusiastic in its praise. The materials used for filling the Cragside silos are of the best and no favour is shown to the notion that anything will do—an idea we have heard expressed in certain quarters. Good succulent clover, vetches, and green oats are employed free from weeds and grown under the influence of high farming. These are pitched on to the top floor of the central tower, and are rapidly fed into the chaff cutter already mentioned as actuated by turbine. The "chop" falls upon the second floor, and is then quietly pushed by rakes over the edge into the silo on either one or the other side Five or six men are engaged tread ing in the green stuff especially taking care that it is tightly packed at the edges next the cement walls. Finally it is covered with thick boards, and 25 cwt weights are quickly lowered by the giant in the basement, and all is quiet.

VICTORIAN "ARBOR DAY."

WE are credibly informed that some families in Ootacamund have decided, in commemoration of the Queen's Jubilee on the 20th June next, to plant a certain number of trees on their grounds on that date, and to repeat the operation every 20th June thereafter; thus establishing an "Arbor Day" in India as is done in America in honor of other notable historical events Readers of the "Mail" will remember that the practice was suggested by that journal as one among many other Jubilee proposals well suited to the treeless condition of many parts of Southern India, and it is to be hoped that it will recommend itself to the popular mind and be adopted as an annual ceremonial by every family, if even to the extent of planting a single tree and taking care of it. Here in Ootacamund we may be said to have already too many trees on private grounds, and the tall blue gums certainly hide many fine buildings from view and dwarf the appearance of others, but as both they and the accacia are grown for firewood, it is probable that they will gradually disappear from the most central parts of the town, and give place to a more ornamental and even more profitable class of arborescent trees: the Mahogany and Box for instance, both umbrageous, longlived, and of superlative value as timber. As to other kinds our choice is limited by the climate to species of the conifera, and of these some beautiful varieties are to be seen in the Government gardens; but what we would most recommend are the walnut and chesnut, the former particularly, a handsome tree all the year round except for a short interval in winter. The yield in nuts from a grove of fifty of such trees would be worth something, to say nothing of their value as fine timber for upholstery purposes when matured by age. A fine specimen of this tree is to be seen in the grounds of "Woodlands" and another in "Llangollen," the former perhaps a quarter of a century old and a prolific bearer. We have no hesitation in saying that if the lands in the wide basin of Ootacamund, were as plentifully planted with the walnut in the early years of the settlement as they have been with the blue gum and accacia, and if the former were given place only on the higher hill slopes skirting the basin, the proprietors of landed property on these hills would be in far better case, the majority of them at least, then they can be said to be in this day. But it is never too late to begin, and to begin on "Arbor Day," next 20th June, and to repeat the planting of the walnut every anniversary of that day hereafter, meanwhile gradually shunting the Australian exotics to the outskirts, would be not only the wisest thing that could be done, from an economical point of view, but it would be the inauguration of a custom associated with the celebration of an historical event: the happy completion of a reign of fifty years by Her Most Gracious Majesty, a reign of peace, progress and prosperity such as the world has not seen, and therefore deserving of loyal commemoration. The nurseries of the Government Gardens are, we believe, able to meet any demand that could be made on them in this respect, but if the plan were taken up as generally as we should like to see it, it might be necessary that the Curator should register, for this year at least, only a limited supply for each applicant so that all may get a few plants and at small cost, if any. For next year's demand a larger number of plants should be raised and freely advertised for distribution so as to encourage and extend the anniversary operations far and wide Our only excuse for giving the preference to the walnut above advocated, is that no other tree that we are aware of comes near it in respect of its many associated good qualities, i. e., among those which can be grown on these hills. There would be a wide range of selection possible at Coonoor, and a still wider range lower down among the plantations and in the Wynaad But speaking for Ootacamund and the higher plateau generally, we all know that the mango and tamarind of the plains, both fruit-giving and umbrageous trees, will not grow here, nor will the teak, the graceful pepal, or the giant fig, or the smaller guava or orange, while the walnut is equal to the best of them and, when fairly above ground, requires as little care as the bluegum or accacia. One of the families who have decided on keeping "Arbor Day" as above mentioned, intends planting the walnut to the number of its existing members, another to the number equaling the years of the Queen's reign, but if all have not sufficient ground to do so much, they may at least plant a single tree and see it attended to, till such time as it is beyond the need of care. What the Municipalities and local Fund Boards may do in the same direction on their own account on public lands we are not prepared to say, but there can be no question that they should influence the establishment of "Arbor Day" throughout the sphere of their several jurisdictions and begin doing so as early as possible.—*Nilgiri Express.*

HINTS IN FEVER.

[BY A PHYSICIAN.]

Typhus Fever.

THIS is also known as ship-fever and chimney-sweep's fever, and according to Murchison and other high authorities, is caused by overcrowding. Everything of an insanitary nature tends to develop typhus fever. Pure air seems to destroy the germs, though they may be conveyed by clothing. The disease is highly contagious, occurs oftenest among those of middle life and the aged, and its fatality increases with the age of the patient.

Symptoms.—Typhus usually comes on suddenly with rigors and much fever. The patient is greatly depressed and prostrated. There are all manner of head symptoms, and they come on early—low muttering, delirium, ringing in the ears, flashes before the eyes, and giddiness. The pupils are often contracted, the countenance is dingy and muddy, the cheeks of a dusky red, and the expression stupid. The bowels are confined and the stools are dark. Thirst, nausea, quick, soft pulse and catarrh are present.

There is a rash breaks out usually on the fifth day. It first comes on back of wrists, near armpits, over pit of stomach, and extends to limbs, but rarely appears on neck and face. It requires from one to three days to develop, and consists of—"(*a*) irregular, dusky red, subcuticular mottling; (*b*) maculæ, or mulberry spots, deepening in colour, and soon not fading on pressure. Disappears from 14th to 21st day. Skin gives off peculiar odour." (Roberts)

There is a gradual increase of fever daily up to the fourth or fifth day, and on the morning of the seventh day a remission comes, but ere long the fever reappears, though not so high as at first. When the patient begins to get well there is a sudden abatement of all fever; this occurs somewhere from the 14th to the 21st day; the patient falls asleep, and the symptoms improve. Typhus fever can be generally recognized without much difficulty. It differs from typhoid, not only in the points indicated, but also in frequently attacking persons beyond middle life, and being much influenced by unfavourable hygienic conditions. There is a great liability to congestion of the lungs from lying on the back. Roberts).

Treatment.—The critical stage is the latter end of the second week (Fenwick). Alcohol is almost always needed, and, when the delirium, nervous symptoms, and pulse improve under its use, does good, and should be continued. It may be necessary to draw the water with a catheter. Elixoid of quinine, iron, and strychnine (or tablets of these drugs compressed) should be given. Tepid spongings, with ice to the head, allay the nervousness and irritability. There is a great tendency for the patient to lapse into a low state, which should be met with stimulants, coffee, &c. The writer has seen good results from chloride of ammonia, an excellent and precise form of administering which is the compressed tablets. In convalescence, "Beef and Iron Wine with Quinine" will hasten recovery.

RELAPSING FEVER.—In relapsing fever there are to be seen microscopically little spiral or corkscrew-shaped germs in the blood, which some consider as the cause of the disease. It is infectious, and usually appears as an epidemic. It is most common in times of famine, and insanitation favours its development.

Symptoms.—This is a strange affection. The patient is stricken down with all the symptoms of fever, and the most marked symptoms are "severe nausea and vomiting of a bitter, bilious fluid, with pain at the pit of the stomach. About the seventh day, suddenly the fever abates, the bad symptoms disappear, and the victim expects to be up in a few days; but in seven days more (the 14th of the fever) a relapse occurs; this lasts from three to five days, when a second relapse ensues; this may continue till the patient has suffered several relapses, which, by the way, diminish successively in their intensity. The patient is much debilitated and recovers slowly. Within the first four or five days the temperature may mount up to 105 degs. The disease may be complicated with bronchitis, sore eyes, dropsy, diarrhœa, and severe pains in the limbs. Recovery is usual.

Treatment.—There is no specific treatment, and judicious nursing is the thing. A laxative tablet should be taken at the commencement; the food should be most nutritious, but always predigested with Zymine, which has become indispensable as a family article; for when any member has fever, his digestive organs should not be taxed. Cooling drinks and sponging with tepid water are grateful. One or two tablets of compressed Dover's Powder are said to greatly relieve the headache, muscular pains, and sleeplessness. Quinine will not cut short the disease, but, in conjunction with the tonic treatment recommended in typhus, will prove of great service.

NOTE.—It is the purpose in writing these "Hints in Fevers" to furnish those elementary points which may prove instructive at the time being, and also be of service as an easy reference and simple guide to those beyond the pale of a physician, or who have many sick under their care. We advise a small portable chest of the usual medicines in the compact form of tablets or tabloids of compressed drugs, which obviate the necessity of weighing or measuring and the dangers of mistakes in dispensing. The desirability of having such a case is twofold; it may prove of vital service to the physician himself, who may not have with him what is wanted, and in case no doctor is at hand with clear and explicit notes, anyone may be enabled to act intelligently, not only in cases of emergency, but of continuous illness.

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XII.] CALCUTTA :- SATURDAY, MARCH 26, 1887. [No. 13.

Health, Crop and Weather Report

FOR THE WEEK ENDING 16TH MARCH, 1887.

Madras.—General prospects tolerably fair.

Bombay.—Reaping operations in progress in twelve and completed in three districts. Scarcity of fodder and drinking-water continues in parts of Dharwar. Fever, cattle disease, and small-pox in parts of ten, eleven, and five districts respectively, and cholera in parts of one district.

Bengal.—Rain reported in many districts. Ploughing for early rice and jute in progress and sowing of indigo going on. Prospects of *boro* rice favourable. *Rabi* crops are being gathered with good outturn. Opium is being collected and is generally a fair crop, but in Shahabad it has lately suffered from rain and hail. General health is fair.

N. W. P. and Oudh.—Weather somewhat unsettled. Slight rain, accompanied by hail, has fallen in some districts. Harvesting of *rabi* in progress. Prospects favourable. Opium collection going on. Markets well supplied and prices fairly steady. Cases of cholera reported in a few places, otherwise the public health is good.

Punjab.—Slight rain has fallen in the Sialkot, Rawalpindi, Dera Ismail Khan, and Peshwar districts, but is still much needed throughout the Province. Health good. Prices fluctuating but generally high. Crops suffering for want of rain.

Central Provinces.—Weather cloudy at close of week. *Rabi* harvest continues. Fever, smallpox, and cattle-disease in places. Prices high in some districts, but generally steady.

Burmah.—March 9th.—Some cholera in Akyab town and in one township of Pegu district. Fever prevalent in parts of Prome, otherwise public health of Lower Burmah good. Slight cattle-disease in district. Reports received from five district of Upper Burmah. Public health good. Food supply scarce, and prices rising in south of Shewbo, elsewhere prices normal.

Burmah.—(March 16th).—Except slight cholera in three districts and slight cattle-disease in three districts, health of Lower Burmah good. Reports received from five Upper Burmah districts. A few cases of measles in Myingyan, otherwise public health good. Food-supplies getting scarce in parts of Shewbo and prices abnormal; elsewhere supplies sufficient and prices ordinary.

Assam.—Weather seasonable, rainy and windy. Pressing of sugarcane and ploughing of land for *ahu* and *dumohi* crops still in progress. The heavy fall of rain during the week has done some damage to the standing crops and retarded the cultivation of land for paddy. Prospects good. Public health fair. Prices steady.

Mysore and Coorg.—Standing crops in good condition, except in parts of Tumkur district. Prospects of season favourable. Public health good. Weather warm in the day time. Cattle-disease prevails in parts. No material change in prices.

Berar and Hyderabad.—Weather clear and warm. Threshing of wheat in progress, and of linseed nearly completed. Rabi crop is being gathered and threshed. Tabi crops prospering. General health fair. Prices steady.

Central India States.—Weather cool and clear as yet. High winds prevail. Cholera reported from Sohawal and parts of Rewah State, otherwise public health good. The prospects of opium and other crops fair. Prices steady.

Rajpootana.—Week rainless. Tanks and wells drying everywhere, high winds prevail. Crop prospects fair. Health good. Prices fluctuating.

Nepal.—(March 10th)—General spring weather. Prospects fair. Prices high.

Letters to the Editor.

THE EUCALYPTUS GLOBULUS.

TO THE EDITOR.

SIR,—In reply to the inquiry of "Timber Speculator" in your issue of March 5th, I write to say that the *Eucalyptus Globulus* is only one of some two hundred species of the genus *Eucalyptus*. It has been successfully grown in India, but only in hill climates of a comparatively dry character, and above an elevation of about 4,000 feet. It is the most commonly grown foreign tree on the Nilgiris, and there grows easily and fast and is easily propagated by seed or by coppicing. I have never heard of its propagation by cuttings, at any rate, more than experimentally. It has been grown in Simla, but usually gets killed down yearly by the frost. At Abbottabad and Ranikhet it has done well, however, though, I believe, not to the same extent as in the Nilgris. At Darjeeling the damp is too much for it, and it only grows slowly and produces poor weedy poles. At Shillong it is said to have done fairly well. It will grow in other hills in the South of India as well as the Nilgris, as in the Pulneys and Travancore Hills and the Shevaroys; and good trees may be seen in other elevated places, as for instance 4,500 feet on Horsley Konda in the Cuddapah district. It will not thrive in the plains of India.

In Australia its chief home is the southern coast of Victoria and the island of Tasmania, but its wood is considered inferior to that of many other species of the genus. An almost exhaustive account of it is given in the 6th decade of Baron von Mueller's Eucalyptographia, to which and to Bentham and Mueller's "Flora Australiensis," I would refer your correspondent for the means of distinguishing the genus '*Eucalyptus*' from other genera. They have usually greyish aromatic leaves of a thick only character, and the blades hang vertically. The first leaves are usually different in shape and texture to those of the mature trees. The *Eucalyptus Globulus* is easily propagated by seed, which is very small and should be sown in shaded nursery beds of good soil in drills 4 to 6 inches apart. When the young plants are 3 to 4 inches high they may be pricked out in the nursery, but a better plan is to let them get to 6 inches, and then move to bamboo baskets or cylindrical pots which should be about one foot long and 3 inches in diameter. The baskets or pots should be stacked on a layer of stone or brick under shade, and when the rootlets begin to show, they should be planted out in pits previously prepared. The best distance to plant is 6 feet by 6 feet and the transplanting should be done in moderately wet weather. The first year, if the locality is suitable, as on the Nilgiris, they will reach 3 to 4 feet, and the second year ten feet or even more.

The wood is strong and fairly durable, but it is liable to split very badly, and it is best perhaps to season by girdling before felling. The weight of the wood varies much as the tree grows older. It varies from 40 to 60 and even to 64lbs, to the cubic foot. It cannot be compared with teak or English oak, but can be used for planking, frames, poles and other purposes, and will answer well—though not so well as that of the *Jarrah* (*Eucalyptus Marginata*) and others of the more valuable species.

Though *Eucalyptus Globulus* will not do in the plains of India, some other species, and especially those from the more northern parts of Australia, have been grown. *Eucalyptus Saligna* and *Eucalyptus rostrata* have done fairly well at Lucknow, I understand, and some species have also been grown in the gardens at Sharanpore and Lahore, and in the forest plantation of Changa-Manga near the latter place.

J. S. GAMBLE.

NOTE.—We are very much pleased to receive the above from a veteran forester like Mr Gamble and are much obliged to him for his interesting and valuable letter. We hope that "Timber Speculator" and other of our readers interested in the *Eucalyptus Globulus* will profit by the information given by Mr. Gamble.—ED., *I. A.*

BABUI GRASS.

TO THE EDITOR.

SIR,—Babul grass (*Andropogon involutus*) is attracting at the present moment the attention of our mercantile community. The Secretary to the Chamber of Commerce has addressed the Agricultural and Horticultural Society on the subject of this indigenous grass, enquiring—

(1) Where the grass is grown ?
(2) Whether it can be procured in quantity
(3) The purpose for which it is used ?
(4) Whether it can be exported ?
(5) To what market it is sent ?

The Society, having referred to its mofussil members, has communicated the substance of their answers to the Chamber. The grass is at present used for making strings for thatched houses. It is used also for paper at the Baily Paper Mills.

There is nearly an acre of land in the district of Bankurah, under babul cultivation. The whole plot is not however thus used, mangoe and other fruit trees being planted thereon. The field is divided by ridges on which the babul grass is planted in the rains. It grows luxuriantly in sandy loam. The grass is cut twice a year, in September or October, and again in the spring, but the September yield is the best. It requires very little care a yet pays well. The ridges are planted with the *kodali* (spade). If our merchants really want babul, any quantity of it can be got by making proper arrangements. The cultivators can be easily taught to improve the cultivation.

SASI B. BISWAS, M.R.S.A.

Editorial Notes.

THE *Pioneer* announces that the Government of India having before them the special report of Dr. Ribbentrop, head of the Forest Department, are willing, it appears, to allow the Bombay Burmah Trading Company to continue their leases of such forests as they were working in Upper Burmah during Thebaw's time. The Company will have to accept such special legislation as the Government may deem it necessary to pass for the good government of the districts in which the forests lie ; but no difficulty is likely to arise on this score, we are told Instead of paying lump sums down annually, the lessees will probably accept the suggestion of the Government to pay on their outturn from the forests, at rates hereafter to be settled.

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RULES have been published by the Bombay Veterinary College recently opened, regarding the mode of procedure in that institution from which we quote the following :—" The diploma of qualification as ' Graduate of the Bombay Veterinary College ' is awarded after a full course of study at the college, and passing the examinations of graduation. Special certificates of proficiency will be awarded to such graduates as, during their period of studentship or after, have attended supplimentary courses on special subjects and passed the corresponding examinations. Amateurs may be admitted as occasional students to such courses as they may elect on payment of a fixed fee, but shall in no case be entitled to certificates, nor to compete for prizes. The course of study for the diploma extends over at least three collegiate years. Each year comprises nine teaching months, and is divided as follows—Long session—1st November to 30th April. Vacation (Spring)—1st May to 15th June. Short session—16th June to 15th September. Vacation (Autumn)—16th September to 31st October. The scholastic year commences with the short session."

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IN 1884 Mr. D. Morris, then Director of the Botanical Department, Jamaica, forwarded some seeds of the *Prosopis juliflora*, known in Jamaica under the name of ' Cashaw,' to the Agri-Horticultural Society of India for trial in this country. Dr. Morris, in sending the seeds, said :—" It is an admirable tree (often attaining a height of 40 to 60 feet) to grow in dry gravelly soil, and in situations where rain does not fall for months together. It is fast growing ; the timber is excessively hard and of a remarkably durable character. It is used for making knees of boats, and all work requiring strength and tenacity. Posts of " Cashaw" in wire fences last longer than any other, and are in great request for that purpose. Kingston is supplied annually with hundreds of tons of Cashaw, which is the only fire-wood immediately accessible. The pods are of a sweetish succulent character eagerly sought for by cattle : indeed in some parts of this island during droughts they subsist largely on them. For horses and mules the pods are also admirable food, but I would add that in their case it is very undesirable to allow them to feed upon the pods immediately after they have been exposed to rain, as ill effects have been known to arise from the partially germinated seeds being taken into the stomach, causing great pain and not unfrequently death ; this last occurrence, however, is so rare that it need not enter into the calculations of the planter. The tree fruits during dry weather when there is little probability of rain, and if the pods are collected and stored in a dry place they will be ready at hand in a sound state for all forage purposes. When thus stored, the pods, instead of being given whole, are often broken up or ground, when they answer admirably instead of corn, oats, &c."

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SOME of these seeds were presented in 1885 to Mr. F. D. Vincent, Nellore, who applied for them, and he now sends the following report to the Society on the results of his trial:—" The seed germinated well and has been tried in this district on 1) laterite, (2) alluvial loam, (3) loose sandy soil, everywhere the result has been precisely the same except that of course on the first two the growth is better (more rapid). The tree refuses to form any proper stem and wastes all its strength in forming long snake-like branches. Two trees in my garden in good soil and well watered are only 9 inches girth, they have about 23 branches each from 5-8 feet long which require more wood than the trees themselves contain to keep them off the round. Their growth is rapid and they flower freely. It is most useless and troublesome kind of tree, with as far as I can see, nothing to recommend its introduction to India where we have enough straggling thorny shrubs." From this it is apparent that the tree does not thrive in the climate of Nellore from whence Mr. Vincent writes : It remains to be seen if anywhere in India it will become the useful tree Mr. Morris found it to be in Jamaica. It might be tried in the Punjab, we think, with some prospect of success.

IN another column will be found an account of an interesting and novel exhibition lately opened in Berlin The object of the exhibition was to bring together all the products of German moorlands, and the best methods of turning these hitherto unproductive lands into fertile fields for the cultivation of Agricultural and garden products. Hence it was called the " Moor Culture Exhibition." It was divided into eight groups. The first consisted of collections of moor and turf land in all its various forms, the second exhibited the plants belonging exclusively to moorland, the third gave province to the amelioration projects, while the fourth exhibited the contrivances for the carrying out of the same. Turf and its products were represented in group V, while the sixth was devoted to the preparation and converting of the same. In group VII, the collective representations were united which showed from the initiatory stage the whole operation of improving and developing moorland. The eighth and last group consisted of all the known literature relating to the subject.

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THE following is the official summary of the report on the state of the season and prospects of the crops for the week ending 16th March 1887. There has been heavy rain in Assam during the week under report and showers have also fallen in most parts of Bengal. In the North-Western Provinces and Oudh and the Punjab slight rain fell in six and four districts, respectively. The *rabi* harvest continues in Bombay, Bengal the North-Western Provinces and Oudh, the Central Provinces, Berrar and Hyderabad, and prospects are everywhere very favourable. In the Punjab the want of rain is still much felt, and the prospects of the *rabi* are unsatisfactory. The *rabi* harvest has commenced in Rajputana, and the prospects of the crops there and in Central India are generally good. In Madras the standing crops are suffering from want of rain, and

prospects are only tolerably fair. In Mysore and Coorg the out look is favourable. The prospects of the spring rice in Bengal are promising, and ploughing for the early rice still goes on there and in Assam. The collection of opium progresses in Bengal and the North-Western Provinces and Oudh, and the prospects of the crop in Central India are fair. Indigo sowing is proceeding in Bengal where the tobacco crop also promises well. Except for the outbreak of cholera in Benares, the public health continues satisfactory in all Provinces. Prices are fluctuating in the Punjab, but are generally high. Elsewhere they are generally stationary.

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In the February number of the proceedings of the local Agri-Horticultural Society, we find the following regarding the *Erythroxylon Coca*:—Mr T. R. Lawson, of the Central Terai Tea Company, Limited sent a sample weighing about ¼ lb. of *Coca* leaf from plants supplied by the Society, he reports one plant to be over 5 feet high and that all have blossomed freely and borne fruit, from which he has not, however, been able to rear plants; he asks for instructions as to sowing the seed and for a further supply of plants. The quantity of leaf is too small for analysis, and Mr Lawson has been asked to send more if possible. Messrs. Jardine Skinner & Co, through whose kind offices *Coca* plants were distributed in 1886, wrote regarding some of them as follows:—"Mr. Wathen, of Springside Garden, Kurseong, writes as follows with reference to *Erythroxylon coca* plants kindly supplied by the Society:—"The plants of *Erythroxylon coca* that were sent up here, all died out: I fear this place is too cold for them. At Mohurgunj they were still looking well. The plants sent to Matelli in the Dooars were about a foot high and looking healthy and strong when the writer inspected that garden, the altitude of which is about 1,700 feet above sea level, in November last. If more plants are available, we shall be glad to, in proper season, make further experiments with them or pay for a supply of seedlings." It was agreed, says the Secretary, that as it is of importance to ascertain where the plant would do well in India and obtain analysis of leaf grown in different districts, a supply of plants should be placed at Messrs. Jardine, Skinner & Co's disposal for distribution to their different tea gardens as that firm has kindly agreed to report results.

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M. Natalis Rondot, of Paris and Lyons, writes from the former place advising the presentation to the Society, through the Government of India, of the 2nd volume of his work on silks, an essay on the physical properties of silk, and an essay on the production, the consumption, and the price of silk. After remarking that he will probably from time to time set forth the bearing of the new facts collected regarding silk-worms, cocoons and silks, many matters being still obscure, M. Rondot remarks:—"In a short time the Indian silkworms will be those least understood, whilst from all other countries caterpillars, cocoons, moths, and silks are reaching us, from India, we get nothing * * * * I have obtained plenty of cocoons but in bad condition, often pierced, stained, punctured, without names, with no indication of their place of origin. Could you not obtain from some of the Society's correspondents perfect cocoons, in good condition, with the indigenous name and the locality from whence obtained? With a few handfuls of dried cocoons we could make experiments which would yield useful information." The ordinary silk yielders, the *mulberry*, the *tusser* and the *eri* are, the secretary says, procurable, but those not in commercial use, like the *cricula*, *atlas* and others cannot be had through the usual channels as they are indigenous to certain localities, few people know them, and some of them even where known and indigenous, cannot be found at all times. Further efforts will be made to assist M. Rondot in his useful

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Simultaneously with the arrival of Mr. Goode (of the firm of Messrs. Goode Brothers, Greenwich) from London, for the purpose of introducing "compressed fodder" into use in India, we hear of an invention of the same order, by Mr. Arthur Rogers, C. E., of the Oudh Railway. The idea of [illegible] is an old one, the novelty consisting in both [illegible] of so preparing the food that it shall become inelastic under hydraulic pressure Indian fodder consists largely of *bhoosa* and the husk of gram, which retain their elasticity after almost any pressure that can be applied to them. What was wanted was to make the crushed food cohere under pressure, and retain its reduced bulk and form, when the pressure was removed. Mr. Rogers hit upon the device of mixing molasses with the fodder, and as molasses is an admirable ingredient in cattle food, and is cheap and plentiful, the device is declared to be a complete success. The fodder is compressible into a very small bulk, while the mixture of molasses therewith, makes it retain the form of a slab when the pressure is removed. Mr. Goode's patent compressed fodder' is, we believe, precisely of this order, but whether 'molasses' is used as the cement of the food, we have not heard. His invention has been taken up by the War Office we believe, and Mr. Goode has come out to India to negotiate with the Government, for the use of his invention by the Commissariat Should molasses prove to be the ingredient, (or cement) used by both, a delicate question may arise as to priority of invention, as it is not likely that either party has knowingly appropriated the invention of the other. Mr. Goode is now we believe at Umballa. The importance of the process will be obvious to our readers, when they read that fodder so prepared can be reduced under pressure to about one-eighth of its natural bulk. Since writing the above lines, we have been informed that an important gathering of Transport officers and others interested in this matter is about to take place at Saharunpore, at which both Mr. Rogers and Mr. Goode will be present. It is intended to investigate the matter thoroughly, and it is hoped that the deliberations of the meeting will result in the early establishment of one or more factories in India for the preparation of the compressed fodder.

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Referring to the recent forecasts of crops issued by the Government of India, the *Englishman* says:—

"It does not say much for the power of organisation at the disposal of the Government of India that it should be issuing a very vague and imperfect memorandum on the area sown with wheat at a time when the harvest is fairly well advanced. When one considers that Government possesses an agency superior to that of any country in the world for the collection of information, the result must be regarded as extremely disappointing. An official paper just published by the Agricultural Department "for general information" takes us back to the rainfall of December and January, and tells us, among other things, that the wheat prospects in Rajputana are "on the whole favourable," that in Hyderabad and Mysore they are "generally satisfactory," and that in the North-West Provinces, taking 100 to denote a full average crop, the "condition of the wheat" was 75 This is very general information indeed, and it would be difficult to say who is supposed to benefit by its publication. If the Government cannot ascertain the acreage under wheat in the various provinces till the middle of March, it ought at least to understand that by that time the information is practically useless. What is to be gained by telling us now that the rains in the Panjab did not begin till the 5th of January, and that the crop was affected with fungoid disease in the following month, when we want to know the state of the crop in March, at the beginning of the harvest? The figures that are given in this paper convey no idea of the extent to which the crop this year will exceed that of last year; indeed, it is only by a careful comparison of all the figures scattered through the statement that one can ascertain that there is a probability of a certain amount of increase. It is to be feared, however, that the figures large and round as they are, are in many cases very wide of the mark; while the effort to work them into a connected whole is little better than elaborate trifling. To form anything like an exact idea of the present yield of wheat, we must wait patiently for the close of the export season, and the publication probably in March, 1888 of the Customs' returns. Meanwhile, no harm would be done were the publication of these meaningless retrospects discontinued."

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Our contemporary has apparently overlooked the fact that it is only within the last few years that this

system of issuing these forecasts has been adopted; and that there must naturally be a little difficulty in arriving at accurate results at the beginning, especially when it is remembered that in some places there exist no such things as village records for the purpose of calculating areas under the various crops. It must, however, be admitted that these forecasts are not all that they *might* be, but even in their present form they are better than nothing, and indicate a willingness and desire on the part of the Government to do whatever they can in this matter—and that is something. We have already expressed our views with regard to these forecasts, and can only express a hope that more sustained efforts will be made in the future to call in the aid of *private* agencies in all parts of the country administered by the crown, on a system similar to that followed in the North-Western Provinces and Oudh with so much success. We cannot, however, endorse our contemporaries recommendation that "no harm would be done were these meaningless retrospects discontinued."

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In another column we print a note drawn up by Mr. Finucane, the Director of agriculture in Bengal, on Silk production and trade in Bengal. The subject has assumed importance now, and we can only hope that some decisive steps will be taken to place this important industry upon a satisfactory footing once more. In another column will also be found a report of the Silk Conference held on the 21st instant at the Imperial Museum. The discussion at this meeting was chiefly confined to the questions for consideration raised by Mr. Finucane in the concluding part of his note; and although these were comprehensive enough for the present, we are not prepared to say that the subject was as thoroughly gone into as we had expected. Having been present at the conference ourselves, we were somewhat disappointed at the 'lukewarmness' displayed by representatives of the mercantile community chiefly interested in silk. The Government representatives showed far more anxiety in the matter, and a desire to do all in their power to help towards remedying the present alarming state of the Bengal silk industry. Mr. Finucane's note, as will be seen, merely glances at the various aspects of the question. The reports upon which it is founded, all go to show that the decline in this once prosperous industry in due mainly to two causes, *viz.*, diseases among silkworms, and an insufficient supply of mulberry leaf. The latter is ascribed to the high rents charged for mulberry lands, whereby the cultivation of the tree is restricted. Insufficient feeding weakens the worms and leaves them too weak to resist disease. It will thus be apparent that the two causes are inseparably associated together, so that the removal of the one will naturally remove the other. But disease has, however, visited almost every filature in Bengal, and the question for urgent consideration at present is the adoption of energetic measures for its suppression and eventual eradication. To this end the efforts of those interested in the matter should be directed.

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The Secretary to the Bengal Chamber of Commerce recently addressed the following queries to the Agri-Horticultural Society regarding *Sabe, Subai* or *Bubui* grass, (*Andropogon involutus*):—

"(1) Where the grass is grown?"
"(2) Whether it can be procured in large quantities?"
"(3) The purpose for which it is used?"
"(4) Whether it is exported in quantities?"
"(5) To what market it is exported?"

A number of members of the Society in different districts were referred to, from many whom answers have been received, and the following reply was sent by the Society to the Secretary of the Chamber of Commerce:—"As I am now in possession of somewhat fuller information regarding the *Sabai* grass, regarding which you addressed this Society on the 11th instant, I have now the pleasure of replying to you at somewhat greater length. In your letter of enquiry you refer to the grass as being exported largely from Tirhoot, but my enquiries confirm the opinion I ventured to express in my note of the 12th instant that *Sabe* is not a product of that district, but it is imported from the foot of the Nepal Hills. The consumption of the grass in the form of string varies with the distance from the source of supply. It is very little used in the south of Durbhunga district, and very largely used in the northern portion of Chumparun. In the latter district it is grown to some extent on the land bordering on Nepal. Locally the grass is used only for making into string but last year the grass in the part of the district referred to was bought up for export and the whole has this year been secured. The grass exported from Chumparun last year went directly to the Bally Paper Mills. In Monghyr district the grass is grown all over the Kharakpore range of hills, it is exported thence to Patna and other neighbouring markets, and large quantities would be available. The local price is about Rs. 1-4 per maund. The only purpose for which it is used is for making into string, and it is sold both as string and in its unmanufactured state. The grass is grown also on the Rajmehal Hills. In Chota Nagpore the grass known there as *B bui* is in some parts *cultivated*; it is grown in Manbhoom district, especially in Burrabhoom and Patkhum in Singboom, and in the Bhuskar jungle in sub-division Jamtara, Nya Dumka district; large quantities may be procured; manufactured into string it is sold at Rs. 3-2 to 3-12 per maund and exported to Bankoora, Raneegunge and Calcutta. The raw product, it is said, is not exported, but can be purchased in February to May at from 12 annas to a rupee a maund. The only use to which it is put is in making string. In none of the districts is the grass used for any purpose but making string for many varied uses"

TREES FOR SALINE SOILS.

Many of our botanists have from time to time turned their attention to the discovery of such trees or shrubs as will thrive on soils impregnated with saltpetre and other saline salts, which render large areas entirely unfit for tillage and the raising of cereal crops thereon. There are such lands to be found in the Punjab, Sind, the North-Western Provinces where they are known by the name of "Usar" lands, upon which scarcely anything in the shape of vegetation will grow, except perhaps the "Usar" grass (*Sporobolus tenacissimus*) and one or two other comparatively useless shrubs of scrubby growth, such for instance as the *Acacia leucophlœa*, *Tamarix Gallica*, and one or two others But the only merit that can be claimed for these plants is, that they grow upon land so impregnated with saltpetre, and what is known as 'reh'; but they do not in any way render these lands fit for the cultivation of such plants as possess a value for man from an economic or industrial point of view, and therefore these saline areas remain comparatively as valueless as if nothing grew upon them But Mr. Charles Maries, the talented botanist of the Durbhunga *Raj*, has made a very important discovery indeed in this connection; and one which we think will be very largely availed of as soon as it becomes widely known; for it is a thing less than the discovery of a plant *that will render saline soils fertile by taking out the salt completely from it.* This will appear at first sight a very extravagant statement; but we have no reason to doubt the truth of it. Mr. Maries writes to us as follows on this subject:—

"Having had to deal with land full of saltpetre, upon which nothing would grow, and having to turn that land into a garden I was much puzzled to know what trees would grow upon it. I tried many kinds, but of all I found the "Rain tree," or *Inga Saman*, the best both for its fine appearance, and for use This tree so entirely takes out the salts from the soil, that if a piece of ground is planted thickly with it, it will entirely change the nature of it in about three years. It is besides, a most valuable fire-wood tree, and bears any amount of "lopping," and after the most severe pruning, recovers its vigour in a year or two. Some of my trees grew 25 feet in 18 months from seed. I had a very bad piece of ground, (the site of an old saltpetre factory) which was four years ago perfectly barren, even weeds would not grow upon it. Now almost anything will grow upon it, after having been thickly planted with the "Rain tree." Another very useful tree is the *Albizzia procera*. This gives a light shade, yields a good timber, and would make a most useful tree for shade in Coffee or Cinchona plantations.

This also thrives in soils impregnated with salt, and is quite as vigorous as the "Rain tree," besides possessing a most ornamental appearance."

We are certainly very much indebted to Mr. Maries for this interesting information, and have much pleasure in bringing it to the notice of all interested in the reclamation of saline area, which abound to such a large extent in many parts of this country.

THE SILK CONFERENCE.

IT was in February, 1886 that a Conference was held in this city to discuss the position of the Bengal Silk industry, which had been declining year by year, and to consider measures for its improvement. On that occasion Mr. Thomas Wardle delivered himself of certain opinions which he held upon the subject, and stated what he believed to be the causes that had brought about such a decline in this once prosperous industry. Sir Edward (then Mr.) Buck presided on that occasion as well as at the conference held on the 21st instant at the Imperial Museum. In 1886 it was generally thought that the decline of the Bengal silk industry was due to a want of knowledge in reeling the silk from the cocoon; indifferent, and even deficient feeding of the worm; and lastly the high rent charged by landholders for land leased to ryots for the cultivation of mulberry trees. The Government was blamed for not interfering in the matter and giving encouragement to an industry for which Bengal had long been famous. What measures, if any, have been taken by the Government in the matter we are of course not aware of; but an alarming report got abroad some few months back that the silk filatures of Bengal were threatened with ruin owing to the appearance of disease among the silk worms of the nature of what is known in the South of Europe under the name of pebrine. Mr. Wood-Mason of the Imperial Museum was deputed to investigate the matter, and his enquiries confirmed the report as to the nature of the diseases which were playing such havoc among the silk worms. He identified these diseases and found that the most prevalent was pebrine, which is known to the native sericulturists under the name of *kata*. It was therefore decided to hold another silk conference to discuss measures as to the best method of remedying matters. At the meeting last Monday there were a number of gentlemen present, both official and non-official. Of the former there were Sir E. Buck in the chair (on behalf of the Government of India; Mr. P. Nolan, Revenue Secretary, Bengal; Mr. M. Finucane, Director of Agriculture, Bengal; Mr. W. C. Macpherson, Under-Secretary, Bengal; Mr. Wood-Mason, Superintendent, Imperial Museum; Mr. A. C. Sen and Mr. N. G. Mookerjee. The non-official members were, Sir A Wilson, Sheriff of Calcutta, Messrs. Walton, Buskin, Lyall, Marshall, Anderson, Walker, Leckey, Hodson, Taylor, and K. L. Banneejee, representatives of European firms engaged in silk.

SIR E. BUCK in opening the conference, said:—Gentlemen—I am much obliged to the Lieutenant Governor of Bengal for allowing this meeting to be called and to you gentleman for attending it. The Government of India is now resigning all official connection with this investigation into the silk industry of Bengal into the hands of the Government of Bengal, and they will have no further connexion with the executive operations. But before resigning the arrangements into the hands of the Bengal Government it seems advisable to explain to you the position in which the official question now stands, and to ask your advice as to the way in which the Government of India will reply to the gentlemen who have corresponded with and brought up the matter, and to ask you also whether there is any way in which the Governments of India or Bengal can in future assist the movement. As you are aware, the gentlemen who have taken a great interest in this industry are Mr Wardle of England and M. Natalis Rondot in France, and both these gentlemen continue to write very interesting letters full of enquiries and advice in the matter. But their advice differs as to the direction which further investigation and action should take. With Mr. Wardle the idea seems to be that improved reeling is required. M. Rondot is more inclined to think that the worms have deteriorated, and that this has led to the decline of the Bengal silk industry, and he considers that an investigation into the worms and their diseases is the more necessary thing to undertake now.

At any rate, we owe much to Mr. Wardle for having revived a greater interest in the subject, and in having offered us valuable advice and suggestions in the matter. But I must say that I quite agree with M. Rondot in thinking that the most important step to take now is an investigation into the condition of the worm and its [illegible] the Government will fulfil its right functions in interfering in any of the operations connected with the manufacture of silk. This I think could be left quite safely in the hands of those who are urged in this direction, by a desire for profit, to do all that can by competition be done to improve machinery, and who are far better judges than any Government officials can be, whether the machinery requires improvement or not. On the other hand, I think the Government can perhaps, give useful assistance in the way of investigating the conditions under which silk worms are reared, and in dealing with natives who are perhaps more ready now, when one of their own countrymen has taken the matter in hand, to receive advice on the subject than they would be from silk manufacturers whom they look upon as having different interests from themselves. What I ask you now to do is to declare the policy which is to be followed in future, in order that I may be able in the first instance, to answer those gentleman who have corresponded with us in the trade, and also in order to see whether the Government of India can do anything more to assist in the way of obtaining an expert from France or in any other manner. I may also add that Mr. Wardle in his various letters does not oppose the idea of investigating the condition of the worm, and that M. Rondot has offered very practical assistance in the matter. You have probably read Mr. Finucane's note which gives a clear history of the operations already undertaken, and will render it unnecessary for me to go over the same ground. He sums up the issues on which the opinion of this meeting is required under 7 heads. M. Rondot in his letter states that two things are necessary in his opinion: one that an expert should come out from France to investigate the circumstances under which the worm is reared here and to examine its condition; the other that we should send seed home to him to be handed over to the principal of one of the seed rearing establishments in France, and who is one of M. Pasteurs pupils. He says that he will be glad to go into the whole question scientifically with the view of ascertaining what the diseases of the worm are. The proposal is not mentioned in the set of papers before us, and I ask you to add it to the list. The other question, as to obtaining an expert from France was dealt with in the discussion of the subject with M. Bisot when he was here, and he was of the same opinion as M. Rondot. The Government of India will, if desired, be glad to arrange with M. Rondot and M. Bisot for the importation of a French expert. In all other matters, I think we may safely resign the direction of all operations in connection with this subject to the Government of Bengal. I can only hope that you will all agree that a right step has been taken in commencing this investigation by the efforts which have been made by Mr. Wood-Mason who has been out at considerable trouble and inconvenience to the silk rearing villages, and whose work has been now continued by Mr Mookerjee, I now ask the meeting to discuss the questions brought forward in Mr. Funucane's note.

Mr. Leckey, a silk broker of this city, then made a long statement as to the utter indifference displayed both by the Government of India and the Government of Bengal in the matter of the decline of the Indian silk industry, although the subject had been before them for many years. The decline commenced about 1868, and nothing had been done by the Government to remedy matters. He considerd it a duty of the Government to have taken effective measures long ago—a duty which they had neglected He had never been consulted in the matter at all, although he would have been in position to give valuable information on the subject. He thought the Government should supervise the silk industry.

generally, but this proposal being put to the meeting was disapproved. The questions before the meeting were:—

(1) Need anything be done by Government towards introducing improvements in reeling?

(2) Need anything be done, and if so what. in the matter of reducing high and differential rates of rent for mulberry lands, or in exp'aining to ryots the law on the subject?

(3) Is the proposal to get out an expert from France or Italy approved?

(4) Should the cocoon exhibitions at Berhampore and Rajeshahye be discontinued?

(5) Should the Government of India be asked to get out cocoons from Australia as proposed?

(6) What encouragements, if any, should be given to M. Vincent de la Roche?

(7) Should a laboratory be started in England for the examination of the various silk fibres as proposed by Mr. Wardle?

With regard to (1) it was generally considered that Government could do nothing; (2) was left out of consideration altogether for the present With regard to (3) after a good deal of discussion, it

was proposed by Mr. Marshall, of the Bengal Silk Company, that the wealthy zemindars and landholders of Bengal, *i.e.*, those interested in sericulture, be asked to assist towards the expenses in connection with getting out an expert from France or Italy and that the European firms engaged in silk should guarantee the balance of the expenses after deducting the amount which the Government might grant for the purpose. This was agreed to and it was added that the Government should put themselves in communication with M. Rondot of Lyons with the object of obtaining the services of an expert for a period of not less than two years: (4) was not discussed. As to (5) it was observed that the silk industry in Australia was not sufficiently advanced to render it advisable to procure seed from these. Mr. Leckey suggested Khorasan or Bokhara as a good field for obtaining healthy seed from. Mr. Wood-Mason here observed that it was not by importing foreign seed that disease could be eradicated, but rather by selection and observing certain other conditions such as cleanliness, ventilation, &c. in disease stricken colonies of worms. In regard to (6) it was decided to offer a certain sum of money to an expert if he would come out to this country and show a method of treating diseased worms in Bengal. As to the last item, it was remarked that it was not yet decided what shape the Imperial Institute was likely to take, and therefore no decision could be arrived as to the establishment of a laboratory in England for the examination of silk fibres; but Mr. Marshall proposed that as it was intended to establish experimental laboratories in Bengal at various centres, it would be more advisable to limit the experiment to one centre, as then the supervision would be better localized. This was generally agreed to. Sir A. Wilson then proposed a vote of thanks to Sir E. Buck for presiding on the occasion, and to the Government for the interest they had manifested in this matter. He also thanked Mr. Finucane for his interesting note on some of the questions affecting silk production and trade in Bengal, and the other gentlemen assembled for their presence on the occasion.

This brought the conference to a close.

ORCHID EXHIBITION.

GARDENING in India is making steady though slow, progress. It is such a charming occupation that it is somewhat surprising to find so few engaging in it to any considerable extent. Up to very recently horticulture as a pursuit was confined to the few who, having a natural taste and love for flowers devoted, their time and attention to the cultivation of some at the well known favourities of English gardens to remind them of 'home.' Beyond this very few attempts indeed were made to cultivate what are known as "rare" plants. It was only in gardens maintained at the public expense that anything in the way of scientific horticulture was attempted, and rare plants cultivated. As for private gardens, they were few and far between, and were owned mostly by Europeans, and to this fact may be attributed the scant interest manifested in the maintenance of anything like permanent gardens, but the peculiarly migratory nature of a European's sojourn in this country will account for this. Horticulture however received no encouragement at the hands of the natives of the soil, probably because they understood so very little of a science which has always been associated with 'hard' and unpronounceable, names, but it is a sign of the times that the native community have within the last few years manifested a deeper interest in this branch of industry, and a few of them have actually established nurseries for the cultivation and sale of new and rare plants with remarkable success. It is with two such nurseries that we are at present concerned, *viz.*, the "Victoria" owned by Mr. S. P. Chatterjee, and the "Empress," owned by Baboo J. C. Biswas, both situated in close proximity to each other in Narcooldanga. Both these gentlemen invited us to pay their nurseries a visit to view their collections of orchids, which are now in full bloom. This throwing open of their establishments to the public is in imitation of the plan adopted by the leading nurserymen at home, such as William Bull, James Veitch and others who hold annual shows of their orchids, to which the public are invited. Orchids have risen greatly in public favour of late years, and being rather difficult of culture, they are naturally regarded with greater interest than other plants. We accordingly availed ourselves of the invitation and visited the two, nurseries, going first—

THE "VICTORIA" NURSERY.

Here the most noticeable among the large collection were the numerous varities of the beautifull butterfly Orchid, Phalænopsis. Mr. Chatterjee has made a large collection of a number of natural hydrids—over a dozen—which have not yet been named even. There was the familiar *P. Schilleriana*, the *rosea*, and *grandiflora*; a very fine new *Phaius* from Nepal, which has not yet been named; a fine specimen of an old favourite, *Oncidium ampliatum*; the beautiful *Vanda cœruelscens*, a new and improved variety of the old *Cœrulea*, and *Vanda tricolor*. Among *Dendrobiums*, we noticed some fine specimens, especially *Macrophyllum undulatum*, *superbium*, *aggregatum majus*, as well as a few well grown plants *D. nobile* and *Dalhousianum*, and an immense cluster of the old and familiar *D. Pierardii*, which was overhanging a reservoir full of water. There was also a nice spike of *Renanthera coccinea*. The show was very good one indeed, and speaks much of the enterprise and energy of the proprietor. After having been courteously conducted through the conservatory by Mr. Chatterjee himself, we left the "Victoria," and passed into.

THE "EMPRESS" NURSERY.

This is a comparatively recent venture, and though not quite three years old, very considerable progress has been made, and a large range of conservatories erected, at considerable outlay, we imagine. The proprietor, Baboo J. C. Biswas, is emulating his neighbour in every respect, and it seems clear that, in another few years, he will have got together a fine collection of plants. The orchids in bloom are not very numerous, nor was the collection anything approaching that of Mr. Chatterjee. But this was to be expected under the circumstances. There were a few *Dendrobiums*, notably *aggregatum majus*, a few *Phaius grandiflora* and two or three varieties of the *phalænopsis* of the *schilleriana* type, and one or two *P. grandiflora*. The conservatory was, however, resplendent with *Dendrobium Pierardii* of which there were scores of plants hanging from the roof. There were of course, many other plants worthy of notice, but we are at present only concerned with orchids. In conclusion we may add that lovers of plants and flowers, especially orchids, should not lose the chance of paying these two nurseries a visit.

Miscellaneous Items.

THE rice crop in Siam this year is reported to have been the most abundant known in that country during the present generation.

A PIECE of stone from the Five Golden Hills, Taranganbah, Queensland, in which gold is not perceptible to the naked eye, has been found, after a careful analysis by Mr. Dixon, of the Sydney School of mines, to yield the extraordinary and almost incredible assay of 7,787 oz. 5 dwt 23gr. of gold to the ton.

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 1st of March was 148,327,497 lbs., as compared with 146,969,921 lbs.; exported in the corresponding period of last year. The exports to the United States and Canada during the same period were 88,276,599 lbs., as against 79,989,291 lbs.

THE Government geologist, New South Wales has furnished the Under-Secretary for Mines with an encouraging report on the Inverell Diamond mines. About 235,151,000 diamonds, weighing, carats, have been obtained during the past 12 months. The majority of the stones are small, averging four or five to the carat, though diamonds of 2 and 3 carats are found.

AN exchange is glad to announce the publication of the first number of a periodical to be edited by Mr. C. S. Plumb, of Geneva, New York. Mr. Plumb is connected with the agricultural station in that locality. The magazine is to be devoted to the promotion of economic science as applied to agriculture, to the dissemination of the results of investigation in the laboratory and the field, the publication of abstracts from the most recent scientific agricultural journals, and the collation of news bearing on the work of agricultural research. The journal is established especially for "scholars and investigators rather than mere readers." Unfortunately scholars and students are not "a paying class," and hence Mr. Plumb's efforts to introduce a high-class journal of permanent value should meet with the more sympathy and support from those who are able to appreciate the necessities of the case.

CONSUL SCHENCK, writing of the salt mines of Cardona, says:—"These famous mines, that form part of the pliocene sediments in the western part of the province of Barcelona, are situated at the bottom of a small valley through which runs a stream tributary to the River Cardona, at the foot and to the south of Castle Cardona, and

cover a surface of 1,519,927 square yards, their greatest length being 5,577 feet, the width varying from 750 to 1,650 feet. The salt deposit may be divided into two masses, one apparently superposed upon the other, although in reality united. The deeper mass, which is the one that is worked is at the lower part of the valley, and here the salt exists in a state of great purity, being perfectly white. The upper mass is not so white as it is formed by belts of different colors due to the presence of metallic oxides, carbonous matter, clay in thin layers, and even small crystals of iron pyrites. Many deep furrows and gullies are formed by the action of the meteoric waters between high and pointed peaks of strange aspect, and also caverns and hollows, called *boflas*, in the interior of the mass of salt are owing to the same course. Owing to the extraordinary richness and purity of the deposit the mines are worked in a manner that causes a great loss of the product. The working is done in the open air. Grades are formed and ditches dug out on these from thirty to forty yards long and eight to ten wide by means of pickaxes and bores, water being used to facilitate the operation. The amount of salt extracted yearly is insignificant to the possible yield, the actual yield not exceeding 50,000 cwts., which is consumed principally in Catalonia and Aragon. The salt is sold at the storehouse at Cardona at forty-five cents the hundredweight."

A SPECIAL despatch received by the Chicago *Tribune* from Canton, Ohio tells of a wonderful invention which may throw natural gas into the shade. It says: "The news comes in response to an inquiry to Mr. W. B Sutler, a neighbour of the inventor, J J. Johnson, of Columbiana, Ohio Mr. W. B. Sutler is a prominent manufacturer of that place. Mr. Sutler replies to a letter addressed him by a Canton business man, and says Johnson has been working on the invention for some time, and has succeeded in perfecting his process to such an extent that wonderful results were accomplished. The principle of the machine is a system of siphons, and air is forced alternately through water and through oil, resulting in gas. The tests made by Mr. Johnson with the machine first finished by him resulted in getting 450,000 cubic feet of gas from a barrel of oil. After this immense quantity of gas has been made the residue of oil, as a lubricator, is said to be worth as much as the barrel of oil originally. It is cheaper than daylight for after getting the light and fuel you have the original value of material you get it from. Mr Johnson made a trip to Boston and had a conference with capitalists regarding the sale of the right to the invention. After his representations chemists from Harvard College were sent to Columbiana to investigate. They reported favourably upon it, and Johnson was given $1,000,000 for the right in the United States, with the exception of Pennsylvania, Ohio, Indiana, and Illinois. Later he sold the right to these four States, with the exception of Columbiana County, to a Pittsburg syndicate for $500,000. The men from Boston who examined the machine said that when perfected no doubt a million feet of gas could be produced from a barrel of oil. As an illuminant it is said to be far superior to the gas manufactured under the ordinary process, and as a fuel is vastly better than natural gas. Its heat is intense. A bar of lead was thrust into the blaze and immediately fell apart. From a pipe from Johnson's laboratory issues a blaze eight feet long that makes an intensely brilliant light. When knowledge of the invention gets abroad it is expected to create a sensation, as it will completely revolutionize the matter of fuel and lighting. The parties who have gained control of the invention have been endeavoring to keep it quiet until they were ready to begin operations."

Selections.

OFFICIAL PAPERS.

SILK PRODUCTION AND TRADE IN BENGAL.

[*Note by M. Finucane, Esq., Director of Agriculture, Bengal.*]

IN this note I propose to make a few remarks on some questions connected with the silk industry in Bengal which have recently been referred to me for report. The discussion of some of these questions is beset with those difficulties arising from ignorance of facts, and that impossibility of ascertaining facts as contradistinguished from opinions which form so striking an element in the discussion of every question connected with agricultural products in Bengal It will be seen that on such apparently simple questions as these —to what extent has their been a falling off in the cultivation of the mulberry plant in recent years; whether this falling off is due at all or if so to what extent, to the high and differential rates of rent alleged to be charged for mulberry lands; whether these high rents have by contracting the area under cultivation with mulberry and thus stinting the food supply of the silk worms caused disease in the worms and degeneration of the cocoons; whether in fact, there has been any such degeneration:—On all these questions there is a wide difference of opinion and in support of the opinions advanced, there is much theorising, but little statement of fact. These difficulties regarding questions of area under cultivation, amount and effect of rents must continue to exist, unless and until we have in Bengal a detailed survey, and such arrangements for collection of agricultural statistics as are to be found in all other parts of India, but are entirely wanting in these provinces.

When the announcement was made that an Indo-Colonial Exhibition was to be held, the Government of India was reviewing the various products of the country with a view to determine which of them might be most likely to reward efforts for the promotion of their development, and decided that silk was the product of which there was most hope. By the wish alike of the Government of India and of the Royal Commissioners, Mr. Wardle came to India "to give encouragement to the extended production of tussar silk, to collect samples of the wild and domesticated silks of India, and to see how it was that Bengal silks had fallen into disrepute within the last twenty-five years."

Having visited various filatures in Rajshahye and Moorshedabad, Mr. Wardle, on the authority of some of the gentlemen whom he visited, expressed the opinion that the fibre of Bengal silk might be preferred in several respects to the Italian, if properly reeled. He attributed the decline in mulberry cultivation, which he had been informed had taken place in recent years, to the high and differential rates of rents charged for mulberry lands, the low prices of the silk market, the failure of the cocoon crops due to want of proper selection of seed by native breeders, and to the introduction of more profitable staples, such as sugarcane and patatoes. It was suggested to him that Government should rear cocoons for seed purposes, and should set an example to private zemindars by reducing the rent for mulberry lands in its own and in Ward's estates.

Mr. Wardle's suggestions having been referred to me for report, I consulted the Collectors of the silk-producing districts on the questions of the existence and effect of high and differential rates of rent, by a circular letter, of which copy is annexed, together with copies of the replies received to it. I also visited Berhampore in July last, and again a few days ago, and made personal enquiries among the managers of the principal silk-filatures at that place as well as from mulberry cultivators and cocoon rearers I likewise discussed the subject with Baboo Nitya Gopal Mookerjee, a Cirencester scholar, who has lately been deputed on special duty on enquiries regarding the decline of the silk industry in Bengal, The following remarks contain the results of these enquiries.

The gentlemen whom I consulted do not attach much importance to Mr Wardle's suggestions for improvement of the reeling process. Monsieur Gallois informed me that he had introduced the reeling machine known as the *Tavalette consono*. recommended by Mr Wardle long before the date of that gentleman's visit to Berhampore, and that the silk made by the ordinary reeling process is quite as good as that made by the machinery recommended by Mr. Wardle. I can offer no opinion on this point which is one for experts to settle. What appears to be clearly the opinion of those who are most interested, is that no action is at present required on the part of Government in the matter of the introduction of improved machinery for reeling.

But it may here be remarked that if no improvement in the reeling process such as is recommended by Mr. Wardle is likely to produce better silk than is at present produced in Bengal it may be questioned whether Bengal silk will ever be able to compete with that of Italy even if the disease among silkworms (presently to be referred to) to which the decline in the industry in recent years is attributed should be altogether eradicated. The eradication of pebrine or whatever the disease may be which is now causing alarm, will only leave matters where they were before it broke out, and Bengal silk was already being driven out of the market before the out break of pebrine among the worms. Mr. Wardle has again, in a letter of recent date, drawn attention to the importance of improved reeling, and says that, with such improvement, Bengal silk can successfully compete with that of Italy and France.

Mr. Wardle laid much stress on the effect of the high and differential rents charged for mulberry land in bringing about a decline in the silk industry in Bengal. The silk of the Indian worm was, he argued, structurally as good as the Italian, but the Bengal cocoon was not as large as the Italian, and did not contain as much silk. This, he thought, might result from the Indian worms being multivoltine, and also from their being imperfectly bred and badly nourished. The insufficiency of the nourishment was attributed to the dearness of the mulberry plant, partially caused by excessive rents charged for the land on which the plant was grown. Before the American War, rent was, he had been told, low; during that war, and in the few following years of prosperity, the rents of mulberry lands were run up and have not been since reduced, notwithstanding the depression of recent years. He therefore suggested that Government might now set an example to zemindars by reducing these excessive rents in its own and in Ward's estates.

A perusal of the annexed circular letter and of the replies to it (Appendix A) will shew, as already remarked that there is much difference of opinion regarding the existence and effect of these alleged high and differential rates of rent It is obvious that if high rent is charged for land of a particular quality, because of its quality, whether it grows sugarcane, patatoes, or mulberry, and not alone because it grows mulberry, there is no reason why Government should interfere to bring about a reduction of the rent of such land in favour of mulberry more than in favour of tobacco, sugarcane or potatoes. If mulberry is not able to compete with these other products on equal terms, the cultivation of mulberry must decline, and Government would not be justified in attempting to prop it up by factitious encouragements. But if, on the other hand, land of a particular quality is let to a ryot at a particular rate of rent, and the ryot is prohibited from growing mulberry on it, or if a special rate of rent, is put on to the land, because the ryot grows mulberry, and that special

e is not charged if he grows any other crop, or if the special e is taken off when he ceases to grow mulberry, and gins to grow any other crop, the prohibition to grow lberry or the levy of a special rate off rent, as the case ay be, would be illegal, and ought to be stopped. Under ction 23 of the Tenancy Act an occupancy ryot, is ction 44 (*b*) it is implied that a non-occupancy ryot, is titled to use any land included in his holding in any ay that does not materially impair its letting value, or ender it unfit for the purpose of the tenancy; while under ection 77, an occupancy ryot is entitled to make any improve-ment, with or without his landlord's consent, and is not liable o pay enhanced rent in consequence of any improvement which he may make at his own expense. The preparation of land or mulberry, and the growth of mulberry upon it, do not diminish, out increase the letting value of land. and it is therefore open to an occupancy ryot (and the vast majority of ryots are occupancy ryots) at any time to prepare at his own expense, with or without the consent of his landlord, any part of this holding for cultivation of mulberry without thereby rendering himself liable to pay an enhanced rent for such land. Moreover the practice of assessing land according to produce, and not according to the capabilities of the soil, was condemned long before the passing of the Tenancy Act—in 1837 by the Court of Directors, who remarked that it must act as a check on industry and discourage cultivation, and by the Board of Revenue who, in their rules, have always drawn parti-cular attention to the importance given to the orders of the Court of Directors by the rapid extension of the growth of new and valu-able staples.

The question to what extent differential rates of rent are, in fact, charged for land solely because of its growing mulberry, and not alone because of the capabilities of the soil, is one which was asked, but has not been, and probably could not, it will be seen from the annexed reports, in every case, be distinctly answered.

There can be no doubt that the rates of rent for high land on which mulberry is grown are higher than for low rice land, which is of a different quality; but the real question is, are the rates charged, when mulberry is grown, higher than the rates which would be charged *for the same land* if sown with sugarcane or potatoes or other upland crops?

In Beerbhoom, Hooghly, and Burdwan, it is reported that the rent charged for mulberry land is much higher than for rice land, but the assessment is not made according to the crop, but to the soil, "it being quite immaterial to the zemindar what crop the ryot grows."

In Rajshahye it is reported that an abatement of 50 per cent. is allowed when mulberry cultivation is given up, though it is some-what inconsistently stated that no special rate is charged when new lands are grown for the first time with mulberry. In the Chan-chal estate in Maldah, differential rates are not charged for mul-berry lands; but when a cultivator takes to growing mulberry for the first time he has to pay *salamees* equal to one year's rent. In Beerbhoom the Manager of the Bengal Silk Company, speaking with authority of the Company's zemindar's says that, in most cases the landlord retains* the right to raise the rent of lands which may for the first time, he planted with mulberry, and generally does so."

It thus appears that the practice varies in different districts. In all districts the rents paid for high land on which mul-berry is grown is higher than the rent paid for low rice land. In some districts higher rent is paid for land on which mulberry is grown because of the quality of the soil, and not because it grows mulberry, and in these the rent does not vary with the crop, it being immaterial whether sugarcane, mulberry, or potatoes are grown. This practice is perfectly legal, and cannot be interfered with.

In other districts a high and differential rate of rent is charged when mulberry is grown, and the special rate is taken off when the ryot ceases to grow mulberry, or a *salamee* is charged, as in Maldah when the ryot for the first time takes to growing mulberry. This practice appears to me to be illegal, inasmuch as under the law it is open to the ryot to grow any crop he pleases as long as he does not diminish the letting value of the land. In the case of mulberry where the ryot has to incur a large initial outlay varying from Rs. 25 to Rs. 100 per *bigha* in raising the land, and rendering it fit for cultivation of mulberry, it is particularly unfair to charge an extra rent in addition. It therefore appears that the practice which prevails in the Chanchal estate in Maldah should be stopped, and that the ryots there and elsewhere should be informed that it is open to them to cultivate any part of their holding they may deem fit with mulberry, without in consequence render ing themselves liable to pay a *salamee* or enhanced rent. Government cannot interfere in order to reduce rents in private zemindaries, but Government officers may, I think, explain the law to cultivators, and inform them that their rents cannot be enhanced in consequence of their growing mulberry if the lands are prepared by the ryots at their own expense, and the letting value of them is not thereby diminished as it in fact is not. Wherever the practice is to charge a special rate, not because of the quality of the soil but because a particular crop like mulberry is grown the practice should be discontinued, not with a view to give mulberry any special encouragement as compared with other crops, but because the practice is in itself wrong and illegal.

There is a general consensus of opinion that high and differential rates of rent have not really had much effect in bringing about the depression in the silk industry in Bengal. It is argued that because the rent is a small factor in the total cost of production of mulberry, therefore a few rupees per *bigha*, more or less, cannot have had much effect in discouraging the cultivation of the plant. It may be, and I think it is a fact that the decline in the cultivation of mulberry is due mainly to causes other than high rents; but at the same time it seems unreasonable to say if a ryot is hesitating between the growth on a particular field of mulberry and potatoes, that his decision would not be influenced by the consideration that, while he would have to pay Rs. 5 rent if he grows potatoes, he will have to pay Rs. 10 if he grows mulberry. The difference of Rs. 5 is a consideration of equal importance to him, whether the value of the gross outturn of mulberry is Rs. 50 or Rs. 100. While then being of opinion that high and differential rates of rent do, and must to some extent affect the area under cultivation, I am also of opinion, having regard to the relative importance of other considerations, that this is not by any means so important a factor in the decline of the industry as Mr. Wardle was led to suppose. It is no doubt one factor, but not the chief or even an important one: and this leads to the consideration of what are generally considered to be the principal causes which have led to the contraction of the area under cultivation with mulberry, and the decline of the silk industry in Bengal. These are the uncer-tainty regarding the profits of the mulberry cultivators and cocoon rearers arising from low and rapidly fluctuating prices, and failure of the cocoons from disease.

In reply to my circular regarding the effect of high and differ-ential rates of rent, Mr. Lyall, manager of the Gaunatea filature belonging to the Bengal Silk Company, pointed out in August last that the decline in the silk industry in Bengal is chiefly due to the ravages which have been made by disease among silk-worms in recent years. This disease is by some attributed to the unhealthy condition under which the cocoons are reared, by others to want of sufficient nourishment, and by others again to the outbreak among the worms in epidemic form, in recent years, of the special disease known in the south of Europe as pebrine. The spread of disease among the worms has within the past few years assumed alarming dimensions, and threatens, it is said, to ruin the industry altogether. Mr. Lyall pointed out that, when similar disease had broken out among the worms in France, it was checked by Monsieur Pasteur's system, the introduction of which he recommended into Bengal.

The attention of the Government, of India having been so led to these facts, that Government in the Revenue and Agricultural Department, deputed Mr. Wood-Mason, Superintendent of the India Museum, and Baboo Nitya Gopal Mookerjee, a Cirencester scholar lately returned from England, to enquire into the whole question. These gentlemen have submitted preliminary reports, copies of which will be found annexed.

It will be seen that they agree with Mr. Lyall in the opinion that the main cause of the decline in the silk industry is the spread among the worms of disease, of which the most dangerous is known to the rearers as *kata*, said by Mr. Wood-Mason to be the same as pebrine. Other diseases also prevail, but they have always been known to the cocoon-rearers, and are of comparatively little importance, while *kata*, which has only been noticed within the past twelve years, is yearly becoming more and more destructive, and is at present causing most serious alarm.

The remedies suggested by Mr. Wood-Mason and Baboo Nitya Gopal Mookerjee, agreeing with the Manager of Gaunatea filature were the (*a*) introduction of M. Pasteur's system, by which moths intended for seed are microscopically examined, and the eggs of such as are found to be diseased are rejected; (*b*) the intro-duction of healthy conditions, that is to say, fresh air, cleanliness, plenty of space and exercise in the rearing of the cocoons, all of which conditions are ignored in the system at present followed by the rearers.

Baboo Nitya Gopal Mookerjee has, by the exercise of much tact and personal influence, induced eight cocoon rearers in two of the cocoon-rearing villages near Berhampore to rear cocoons under healthy conditions, entirely in accordance with his instructions. He selected cocoons in Rajshahye before they were spun, in the worm stage free from all visible signs of disease, but he has not microscopically examined them either at the moth or at any other stage. These cocoons he distributed among his eight rearers. Their nurseries and trays were fumigated, arrange-ments for lighting and ventilating the nurseries were made by intro-duction of glass windows in the walls, and of ventilating pipes in the roofs of the rearing huts. He has also intro-duced arrangements for securing cleanliness by having double nets for each tray, and he has supplied untainted mulberry leaves to the worms as food instead of leaves tainted with excreta of diseased worms which are used by the native rearers. Further, selections of the healthiest worms are made at each moulting as well as at each feeding, the weaker worms being rejected. In short, what he has done is to select, as far as he could without microscopic examination, healthy cocoons, healthy moths, healthy eggs, and healthy worms by a process of natural selection, and by rejection of such as appear to be weakly, at every stage, from the beginning to the end of the rearing process; he is having the cocoons, moths, and eggs and worms thus selected, kept under healthy conditions as regards air, space, and food. It is hoped that cocoons thus reared will be much superior to those reared in the ordinary native fashion, and that though the quantity thus produced be less, the quality will be so far superior as to be eagerly sought after for seed, and that other rearers in the seed centres will be induced to follow the example set in these villages.

The results of these experiments will show to what extent dis-ease is due to the unhealthy conditions under which cocoons are reared at present, and whether it may be eradicated by more healthy conditions; but if the cocoons which Baboo N. G. Mookerjee distributed (which it will be remembered were not microscopically examined) were themselves tainted with pebrine it is not likely that perfectly healthy cocoons will be produced from them under any conditions however healthy.

Microscopic examination of the moths followed by rejection of all found to be diseased is necessary, and it is for this purpose that I think it is desirable to get out from Europe an expert who

* He never had any such right to retain.

is familiar with Monsieur Pasteur's system who will examine the moths and teac Baboo N G. Mookerjee to do so likewise. I do not think that Baboo N. G. Mookerjee can be expected to do this unaided, nor does he think so himself.

Baboo N. G. Mookerjee's supervision and aid will be invaluable as he has already shown by his successful efforts in getting the rearers to adopt more healthy methods of rearing the cocoons, and also after instruction by the expert, in the microscopic examination and selection of healthy seed. But I do not think that he alone will be able to do all that is required

What I recommend is therefore that a Frenchman or Italian be got out on a salary of Rs. 200 to Rs. 300 a month for one year at least; that he be associated with Baboo N. G. Mookerjee and placed under him; that he and Baboo N. G. Mokerjee work together in the microscopic examination of the moths and selection of healthy seed, that pending the Frenchman's arrival Baboo N. G. Mookerjee continue to work, as regards the rearing of the cocoons, on the lines now being followed by him which are those recommended by Mr. Thomas Dickens in his "Guide to Sericulture." If the results of these experiments should be satisfactory, there would be no great difficulty in getting the cocoon-rearers at all the seed rearing centres, of which there are only six altogether, to adopt similar arrangements.

The cost of carrying out the proposed arrangement is estimated at Rs. 20,000, details of which will be found annexed, (marked F.) One third of this amount might be paid by the Government of India, one third by the Government of Bengal, and the balance might be defrayed by contributions by the firms interested in the silk industry, all of whom are willing to co operate with Government in this matter,

Miscellaneous questions—Among other questions which have been raised in recent correspondence on silk is that of the expediency of continuing to hold cocoon exhibitions such as have been held in recent years in Berhampore and Rajshahye. There is a general concurrence in the opinion, in which I agree, that these exhibitions should be stopped The amount now in hands of the Committee at Berhampore (about Rs 880) should be expended in the manner indicated in the last paragraph

Importation of cocoons from Australia—The question has also been asked whether Bengal reeling labour, which is now employed only for six months in the year, might not be utilized in reeling Australian cocoons if imported for that purpose. Messrs. Gallois and Stocks of Berhampore, whom I consulted on this point, would be glad to purchase cocoons from Australia, but are unable to say whether they can do so with advantage till they receive specimens and are informed of the price at which the cocoons could be imported. The Government of India may, perhaps, be able to arrange with the Australian authorities for a supply of specimen cocoons, and may be able to procure information regarding their price delivered in India.

Another question which has been recently raised in connection with this subject is whether it is not possible and desirable to convert the multivoltine worm of Bengal into an annual. Monsieur Vincent de la Roche claims that he has discovered—

(1) a method of preserving the yearly breed of silkworms;
(2) a method of converting the multivoltine worm into a yearly breed.
(3) a method of preventing the irregular birth of the worm,
(4) a method of rearing the silkworm for industrial purposes, when and how the sericulturists wish it.

A the result of this method, the quality of the thread of the silk cocoons is, he says, improved, and the breeds of the worms are preserved healthy and improve daily.

M. Vincent de la Roche asks that he be put in communication with Mr. Bashford who made experiments from 1854 to 1875 in improvement of the breed of silkworm at Surdah

He also asks Government to take " the initiative of recompensing and encouraging him" before he imparts the result of his discoveries.

His letter has been circulated among gentlemen interested in the industry, who it will be seen appear to have no great confidence in the value of his discoveries (Papers maked C).

Messrs. Jardine, Skinner are, however, willing to put M. Vincent de la Roche in communication with their present manager at Surdah.

The question has also been asked by Mr. Wardle whether, in the interests of the silk industry in Bengal especially and also of tussur silk, it is not necessary to institute in England a small laboratory for the examination of the various silk fibres of the races and breeds even of each species produced in India so that such structural examinations can go on side by side with these entomological and biological ones that have been started at the Indian Museum, Calcutta."

The papers on this subject are annexed marked E,

In this note I have merely jotted down the various questions which have been raised in recent correspondence without attempting anything like an exhaustive discussion of them. For information regarding the past history of the silk industry in Bengal, reference may be made to—

Silk in India, by Mr, Geoghegan	1872
Memorandum on Silk in India, by L. Liotard, Government of India, Revenue and Agricultural Department	1883

18. The following papers are annexed—

(a) Correspondence regarding existence and effect of high and differential rates of rent for mulberry lands.
(b) Preliminary reports on disease of silkworms, by Mr. Wood-Mason and Baboo Nitya Gopal Mookerjee.
(c) Correspondence regarding proposals by M. Vincent de la Roche.
(d) Statement showing value of mulberry silk exported in recent years,
(e) Letters from Messrs, Wardle and N Rondot of various dates in 1885-86
(f) Detailed statement of expenditure proposed in paragraph 12 prepared by Mr. N. G. Mookerjee in communication with Messrs. Gallois, Marshall and myself.

19. To sum up, the questions for consideration are these—

(1) Need anything be done by Government towards introducing improvements in reeling?
(2) Need anything be done, and if so what, in the matter of reducing high and differential rates of rent for mulberry lands, or in explaining to ryots the law on the subject?
(3) Is the proposal to get out an expert from France or Italy approved? Are the estimates of expenditure and the proposed distribution of cost approved?
(4) Should the cocoon exhibitions at Berhampore and Rajshahye be discontinued?
(5) Should the Government of India be asked to get out cocoons from Australia as proposed?
(6) What encouragement, if any, should be given to M. Vincent de la Roche?
(7) Should a laboratory be started in England for the examination of the various silk fibres as proposed by Mr. Wardle?

THE HORSE SUPPLY IN INDIA.

Major Humfrey and Col. Tweedie are local writers well known to our readers in connection with the important question of the "Horse supply in India." The first is anxious that Government should go in largely for country-breds; the second advocates the establishment of nurseries, in which Arab colts, picked up cheap at a very early age, could be reared and trained. A writer in *Blackwood's Magazine*, who is evidently an expert like the other two, maintains, on the other hand, that the most important source of horse supply for the present army of India is Australia. "There can," he says, "be no doubt that, taking them all round, the Australians, or *Walers*, are now the best horses in India." The horses found in the ranks of the Indian Army are generally arranged under five heads—as Arabs, Persians, Northerns, country-breds, and Australians or *Walers* Formerly many very sturdy horses came from the Cape; and latterly an attempt has been made to import Hungarian horses from Trieste. But this effort, though the horses are cheap for their quality, is still in the experimental stage. In the old days most of the horses required for the army in Bombay and Bengal were purchased in the Arab stables of Bombay. The horses for the Madras Army were landed at Mangalore, and marched across country to a remount depôt near Bangalore. But owing, partly to the restrictions put by the Turks on all export of horses from Arabia, and partly to the new Government regulations on this side, the supply of Arab horses to the Southern Presidency has entirely ceased. The writer in *Blackwood* though he owns that the general run of Arab horses are first rate, thinks that they are too small to prove satisfactory mounts to any but native cavalry. Persian horses are, however, among the most useful remounts in India, whether, for cavalry or for gun teams. They have more power and size than Arabs, with much of the same constitutional good qualities, and—a matter of great importance to the State—they are generally cheaper in price. But the available supply is small, and it is virtually limited to the Bombay Army. The writer does not seem to be aware that Colonl Ben Williams, the head of the Indian Remount Department, has lately been travelling in Persia making arrangements for a much larger future supply of Persian horses. If his suggestions can be carried into effect, we are likely to hear a good deal more of the Persian horse as a remount,

The "Northern" horses used to come in large numbers from one of the two great markets for Asiatic horses, Herat and Cabul. This source of supply was interrupted during the Afghan War, and has since been strangely neglected by the Government. It might easily be revived, and especially, if possible, for the class of Northerners known as "Turcomans," "that splendid and enduring race of Arabs, which from the peculiarities of the soil, now equal to English thoroughbreds in size and resemble them in appearance." All Indian travellers in Turkistan have been of opinion that the horses of the Tekke Turcomans have no equals for war service, and many years since Colonel Baker said, "It is singular that the magnificent breed which is to be found in such numbers among the Turcomans has never made its way on any large scale into Hindoostan" They are now naturally drifting into the hands of Russia, but still the horses of Northern Persia are of much the same breed, and these should be available either *via* Herat, or through Bushire or Bunder Abbas on the Persian Gulf. Of the country-breeds, the Kattywars were probably the best of the old distinct races of the country, marked as they were by extraordinary powers of endurance. But the breed has not been maintained in its original purity. It is to the revival of this breed that Major Humfrey has devoted his best energies, and he has already succeeded in gaining for country-breds some important racing concessions, which are likely to stimulate private breeders. But Major Humfrey would agree most warmly with the writer in *Blackwood* that "if success in horse-breeding in India is to be looked for on any great scale, it must be due to the efforts of the English Government—and is is no new thing that this subject should be considered of the highest importance; and the power of providing in the country to a great extent for the wants of his own army has always been looked upon as a most desirable object to be attained." In the old times the stud department provided horses of great endurance and blood. Sufficient numbers were produced to mount the British cavalry and artillery in the North-West Province, and we are now told that, as a proof of their good qualities, that as late as 1870 there were still to be found efficient animals in artillery teams which had taken their part, and done their duty well, in the long marches and severe work of the

Munlty campa gns. The Nizam is trying some interesting experiments, and is understood to have bred a few very good horses, and fair remounts for native cavalry have been bred at the Coongul farm in Mysore There are few ways in which the native chiefs can be of better service to the Government than by devoting a portion of their ample means to horse-breeding, and few more pleasant. Our writer, however, differs essentially from Major Humfrey in thinking "it is very doubtful whether, under present Government arrangements, horse-breeding in India will ever produce the desired result of a permanent and trustworthy supply of good animals." And for that reason he looks chiefly towards Australia.

The importation of Australian horses into India only dates back a little over thirty years, and at first they bore a bad character. They were coarse wild, ragged-looking, long legged animals with curiously exaggerated powers of buck-jumping. But gradually a class of middlemen has sprung up in Australia who, though they keep large runs, are not breeders. They purchase the young stock, feed them on the grass-lands, handle them and train them, and then sell them to shippers for the Indian market. They perform the exact functions that Colonel Tweedie wishes the Indian Government to undertake in Arabia itself, and their success in Australia is a point in his favour. The principal shippers engaged in the horse trade between Australia and Calcutta are Weekes, Baldock, Warran, Vanrenan, Cavanagh, and Hunder, and between Australia and Madras Korouse. Madden, Learmonth, Gidney and others The trade is believed to be a very profitable one and the late John Wilson, the Circus proprietor, dabbled in it to very good account. The horses are now generally carried in steamers, not in sailing ships and arrangements are often made to allow the sick horses to lie on sawdust beds—a plan that has not yet been attempted in the Arab horse trade from the Persian Gulf. The average price paid by the Australian shippers is a trade secret. But it cannot exceed from £15 to £20 all round. The Government limit for the purchase of Australian remounts has been lately raised to £50 sterling. They rarely find their way into the ranks of the native army. But says our writer, to carry the sturdy English dragoon or to take their places in the teams of horse or field artillery, it would be hard, even in Europe—to find animals more suitable." On the other hand, they are exotics and require to be carefully acclimatised. But, if they are well fed and well cared for, they are physically superior to Asiatic horses just as Europeans are physically superior to Asiatics. Everything depends on the manner in which they are acclimatised. and this has only of late years been carefully studied. There is little doubt, we are told, that no army in the world is better mounted than that of India is in its normal condition. But, if a time of pressure arise we should have to depend almost mainly on the animals now in private hands. The writer says that there is only one plan feasible that a number of horses equal to one year's requirements should always be kept in reserve at the depôts, in addition to the remounts for the current year. These horses he would apparently obtain from Australia We venture to think, however, that he does not lay enough stress either on the importance of country-bred stud farms or the possibility of a greatly increased supply of large boned horses from Persia. The question is one of great importance. Asia is the land of mounted warriors, and in all its historic struggles and conquests, crowds of horsemen have ever taken a distinguished part. It is also the land of enormous distances, and it may be readily conceived as he puts it, "with what magnitude the question of horse-supply shows in the eyes of the military chiefs and organisers of India" —*Times of India.*

IOWA'S EXPERIMENTAL WORK IN HORTICULTURE.

At the recent meeting of the Eastern Iowa Horticultural society Prof. Budd being called upon for the purpose, made the following statements in substance of the experimental work now being carried on by the Iowa State Horticultural Society, and mainly under his direction. We copy the portion used from *The Homestead.*

"We now have 18 experiment stations in the state, and will ultimately have about 25 outside of the central station at Ames. We will send all new varieties thought to be worthy of trial to all the experiment stations in the state. This selecting will be done by a selecting committee of five, and they will determine what, and where things will be sent; of course attention being paid to the probable value of varieties and their adaptation to different localities. This stock will be sent out at the expense of the state society; and as these stations are on private farms the plants of course become the property of the grower or owner of the ground under restrictions of the society and direction of a committee. We have been so far sending out novelties and new varieties thought to be suited to places to which sent. This is one line of our work.

"The state society has formulated a premium list and rules for paying premiums for seedling fruits grown from seed. A new seedling apple, for example, that received premiums for 20 years would in the 20 years receive nearly $4,000. There are also second premiums, and as all our common fruits are in the list, you see there is considerable encouragement given for new varieties. At first thought the $1,500 per year would not be considered sufficient to pay much large premiums, but in 20 years the appropriation will aggregate $30,000. We have been doing considerable experimental work at the Agricultural College, introducing the varieties of apple, plum pear, cherry and ornamental trees of East Europe. We have propagated this stock at the Agricultural College, and distributed it to sub-stations, and we now have sub-stations all the way from the Rocky Mountains to Maine and Vermont, even in Manitoba. Many of these ironclads have fruited. We now have plates and casts of over 100 varieties fruiting since these severe winters began. Indeed we have done more in these few severe winters and dry summers than we could have accomplished in twenty years of ordinary times, as we have obtained results that could not have been secured in ordinary seasons. We are getting reports from these 800 stations, and as fast as they come in they are tabulated and kept in a big ledger prepared for that purpose. We have over three hundred varieties of the different fruits in these stations, and we expect to tell the story within the next ten years; not our story but the story of the hundreds that are trying them. There are examples of our experiments There are classes of apples that we are testing. There are several of the class of Yellow Transparent and Thaler. They are two weeks earlier than our old varieties and are of better quality than Early Harvest. There are about ten varieties that we have of the Duchess family. Like Duchess in fruit and tree and habits of growth; one is two weeks earlier, some a week earlier some a little latter and so on for two months later; the only apparent difference is time of ripening. If you were to pass an orchard of these varieties, you would call them all Duchess. Then there is the Aport family, very much like Alexander. Then there is the Longfield family running into many varieties. We have many of these catalogued and described in our bulletin, which we send out free. If any of you want it, send a card and it will be mailed to you."

[Here follows a description of the process of artificial cross fertilization, but as this was described by the professor in a recent article in the *Farmer's Review*, we omit it.—Ed.]

"As to our plan of experimental work: We propose to send all promising new varities to the experimental stations. The stock will be owned by the keepers of the stations, but kept under rules of the society. Keepers of the stations will report as to hardiness and general behaviour, but later we expect a committee will, at proper times visit these stations to see that the requirements are complied with, and report as to success at the different stations, and their reports will be carefully filed away, the desirable parts being published. Thus we will have results from parties not interested. Any person originating or introducing a desirable kind can send plants to our stations but can control stock by having those seeing it sign an agreement not to propagate without premium They can thus get a reward of the behavior of their stock without losing control of it. In this way we get new varieties and are testing them before they are known or on the market.

"From a consideration of plant breeding we are led to the conclusion that Darwin reached after pursuing this subject thirty years. He, after working year after year with over 500 specimens of plants and thousands of varieties, concluded that nature abhorred self-fertilization, and concluded that this was a wise provision of nature to sustain the vigor of a species, as succession of generations of self-fertilization causes degeneration. By tenth or twelfth cross of a variety, or in, breeding as we might call it, would ex-terminate the plant. The first thought is that as pistils and stamens are both formed in the same blossom no outside fertilization is required, but as a matter of fact, the least speck of foreign pollen is prepotent. When we are asked why this is so, we must say that we do not know, but consider it a wise provision of nature to retain the vigor of a species. I would like to offer another thought but will commence in another direction. We have had a good deal of discussion as to blossom of Miner plum. If we examine Miner blossom we may find nothing wrong, yet the trees may not bear, while Miner near wild plums generally bear. The facts are that the pollen may be wasted before the stigmas are in condition to be fertilized. Mr. Speer some years ago found a very fine wild plum, in a thicket, that bore well, but when moved to his own ground it did not bear, and he was ready to go back on it, but, on college ground intermingled with other varieties it bears well. We have a grand field for work in cross-fertilizing our native plums with foreign varieties.

"There is another matter that I make no delicacy in speaking of here because we are not doing it for the money but to introduce the subject of intermingling varieties and cross-fertilization. The college is sending out a collection containing our best natives, with varieties from East Poland, Silesia, and Russia, one hundred trees consisting of twenty-five varieties, one year old, for $10. But we expect the purchaser to plant in group and report results The charge of ten cents each is to help to cover cost of production and handling. The purchasers will in this way have an easy opportunity to plant seed, and thus get cross-fertilized varieties, and we are sure that it will result in great benefit to our state.—*Farmers' Review.*

GHEE AND ITS ADULTERATION.

Mr. B. S. Shroff, L. M. & S., read an interesting paper before a recent meeting of the Grant College Medical Society on "The Ghee Supply of Bombay; its adulteration and means to prevent it. We gave below extracts from the paper, which was of highly interesting and useful character:—

"The consumption of ghee in India but Bombay particularly, is I think more extensive than in any other country having an equal number of population, from the peculiar dietetic habits of the people, except in the case of the Bedouins near the Red Sea and the Persian Gulf who are said to use a cupful of ghee before breakfast. The import of ghee in Bombay by rail, in addition to local production, annually amounts to about 92,055 Bengali maunds or 2,69,621 Bombay maunds; by sea from ports within the presidency,

35,785 Bombay maunds, and from foreign ports, 33,839 Bombay maunds. The quantity, large as it is, is not all that is consumed here. The local production of ghee and the addition of fat, &c., should give us an actual local consumption of about 4,50,000 maunds ghee in Bombay. This very extensive trade is confined to about 12 persons only in Bombay, eight of whom are Hindoos, mostly Bhatias, and the rest four Mahomedans dealing in ghee imported from foreign ports. The Hindoos have their agents in most of the railway stations and sea ports in the presidency. These agents buy the ghee from the natives of the soil known as Kishans in some places who are mostly cultivators, or from Vanjars who periodically bring in loads of ghee on cattle from distant places. The agents form a clique at every station, and do not allow strangers to enter the business. The ghee thus bought may be fresh or stale, and in the latter instance rancid But there is no adulteration. At times the ghee contains more whey than usual, which, being soon decomposed, turns it rancid. This in many instances is due to an imperfect process of heating. Such ghee is bought at lower rate than good ghee, and re-heated for improvement. The adulteration is carried on on a very large scale both here and in the stations from which ghee is imported, but in both these places the parties are one and the same, i.e., the merchants or their servants. Ghee is adulterated with injurious and non-injurious articles. The articles used in adulteration, Mr Shroff says, include various oils, fats from deceased and slaughtered animal carcasses, and other compositions. "The fats are mostly found in ghee imported from foreign ports, and also in Kurrachee ghee. They are also added to rancid ghee in Bombay. There are special godowns somewhere at Mandvi where regular professionals, called Tavanyas or beaters, are engaged for the purpose. Animal fat is generally added in proportion of 10 seers to a maund of 40 seers of ghee; and with a view to do away with any animal odour of the fat, about 10 seers of curd is also added to the above composition. This sort of composition is provided, among others, to all Government departments where the ghee supplied is not kept long before being used. This is but a natural result of the low rates offered to merchants who cannot get pure ghee even at much higher rates. This composition is also supplied to various lines of steamers, where the services of native crews have been engaged. It also finds a market among the poor classes of the population who buy their rations daily. There is another composition consisting of equal parts of Kardhaya oil and fat This composition is mostly used among the poor classes of Mahomedans and more particularly in Mahomedan boarding-houses This kind of ghee to all appearance looks like good ghee, but it has a peculiar greasy taste found commonly in fat. The fat is objectionable on the ground of its being derived in many instances from diseased animal carcasses, and from other repulsive sources. I am borne out in my latter remark by the Secretary of the Calcutta Health Society who remarks in his letter to me thus :—" There is reason to believe that some of the fat employed in the process is obtained from most repulsive sources."

Among other compositions used are wax, paste made of ratalu, diascoria sativa, banana, inspissated curd, potato pulp, and various kinds of flour.

" Among the oils used for adulteration there are some which are injurious and others not. The latter include cotton seed oil, sesamum oil, the oil drawn from Guizotia Abyssinica or Oleifera, Cocoa Nucifero, Garcinia Indicum, Arachis Hypogæa, and Carthamus Tinctorius. These are added to pure ghee or to a composition consisting of fat and ghee in various proportions, and although their use is in no way injurious in point of health, yet they are not borne by weak stomachs, giving rise to dyspeptic complaints. Again, the combinations of oils are not worth the money for which they are sold, and are objectionable on the ground of fraudulent sale. This sort of adulteration is largely carried on at almost every station where these oils are obtainable The value of these oils varies from Rs. 4 to 5 per maund. The injurious oils are the mowra seed oil, the khakhan or pilvan oil, and the madvising oil. These three oils are irritant in their nature, and cause inflammation of the primæ viæ The mowra-seed oil is largely used in the adulteration of ghee in the Guzerat, Kattywar, and Jubbulpore districts It is added with a view to increase the weight of pure ghee as also to give it a yellow colour to imitate the ghee prepared from cow milk ; 10 seers can be added to a maund of good ghee. The khakhan oil is similarly used in Guzerat and Bombay as also to give greater consistency to liquid ghees. It is also added in proportion of 25 per cent to good ghee while being heated, and then the mixture is allowed to cool in earthen jars put underground. The madvising is similarly added Other non injurious articles are added to ghee with a view to improve old or inferior ghee in quality, hardness, and odour, and to increase its weight. With the object of arriving at correct conclusions I have examined several samples of ghee. I have examined nearly 60 samples of different ghees, and in all instances they were found, with the exception of eight specimens, to be adulterated with some one or other of the articles named above. The process I followed was that laid down by A. W. Blyth, in his manual of Practical Chemistry. In ten specimens I found, on heating in test tubes, sediments amounting from 5 20 per cent of the quantity used. They consisted of some starch and vegetable matters. These specimens were obtained from localities where the people are very poor. The rest 50 did not give any solid sediment, but deposited milk-butter in variable quantities, not exceeding 1 2 per cent in any instance The colour of these specimens was not a criterion of purity.* Even the colour is deceptive. In many instances turmeric water, betelnut leaves, and annoto are added, while the ghee is being adulterated with fat and other colourless oils to improve the colour To summarise the above, I may state that the articles adulterated by vendors of ghee are injurious to health, from their being irritant in their nature, or being derived from diseased animals, or from their being unsuited to delicate stomachs. To remedy this evil, neither the present Bombay Municipal Act, nor the draft revised Municipal Act, nor the Penal Code, is at all sufficient."—*Times of India.*

THE NATIVE CULTIVATOR.

A PLEA FOR CASTE.

OBSERVERS of the habits of the people of this country cannot but admire the rules made by their patriarchs for their welfare, which non-observers designate as superstitious and caste prejudices. "The duty of instructing the masses belongs to the Brahmins, and as they receive payment for their services in kind, their interest is the same as that of those whom they teach. The practical results of their labour can be seen in every-day life, for the Hindoos turn out the best cultivators, artisans, and scholars in India. The laws which regulate the lives of the Hindoos at first sight appear ridiculous, and of such a binding nature as to leave no hope of advancement This is not so, for sufficient freedom is allowed in cases of emergency. For instance, a Brahmin can quench his thirst with water from a raw cowhide water-bag filled by a Mussulman without losing caste, by the simple expedient of scraping a hole in the ground for the reception of the liquid, the idea being that by contact with mother earth the water becomes purified This explains how it is that all the castes can take water from the same well The silk-worm rearer must not bathe or wear clean clothes during the time he is attending on the worms, but he can wade through running water. He must not talk about the diseases of the worms, speak about cocoons, or even set eyes on one, but he may converse as much as he likes on the silkworm, fly, ants, and other parasites, and plot and work out engines of destruction for the same. The rule which prevents the rearer from being allowed to see a cocoon is one of the wisest which could possibly have been instituted among a dilatory people. It forces him to dispose of every cocoon before the new batch of worms hatch out. The natural consequence is that he has to thoroughly cleanse his house and rearing-rooms, so that there shall be no chance of his seeing any cocoon, the result of previous rearing, and in this manner all the larvæ of flies and other parasites are effectually disposed of.

On the same lines instruction is given to the agricultural classes, and he would be a daring individual who would at the present moment guarantee a lasting benefit to India by the use of deep ploughing, threshing machines chemical manures, teaching cattle to eat wheaten straw whole instead of *bhoosa*, or by allowing fruit to ripen naturally. The Indian cultivator has some method in his madness in insisting on the straw being flattened out for herein lies the whole secret of keeping down insects destructive to crops, when science can give no practical relief. The action necessary to flatten out the straw causes the sound grains of wheat to be thoroughly cleansed of all ova and impurities All hollow, soft, and unsound grains are pulverized by the action of the bullocks' feet, and the unsound grain is winnowed out with the pieces of flattened straw.

The simple and general manure in use is ash, the product of all farm refuse and old roots and stems of crops. This manure benefits only one crop, but the manufacturing of it destroys the larvæ of all pests lurking within the refuse. Deep ploughing must also add to the risk of harbouring insects injurious to crops, by enabling the larvæ to penetrate deeper into the soil, and thus escape the dry heat of May and June, which is injurious to all insects in the chrysalis or pupa state.

The habit of plucking fruit green, and allowing it to ripen in straw in a dry place does good to the whole community, for by this means the larvæ are removed along with the fruit and placed in conditions most adverse to their development into perfect insects. The scientific farmers of England and America look to quick return on capital, and if the individual would be considerate enough not to live too long, his books would show handsome profits by the use of deep ploughing, threshing machines and artificial manures, but at the expense of those who come after.

CINCHONA-GROWING IN MEXICO.

WHEN commenting, a few months ago, upon the practically unlimited capabilities of Mexico as a drug-producing region, we mentioned that the cultivation of cinchona was successfully carried on in that country, in the neighbourhood of the town of Cordoba.

We have since made some inquiries concerning the extent and importance of the Mexican cinchona plantations, and the probability of bark from that quarter competing in the near future with the product of Asia and South America on the markets of London and New York. It would seem that for the next few years, at any rate, there is no probability of cinchona being exported from Mexico. All the bark which is grown in the Republic is consumed in the country, local wholesale druggists buying it at prices ranging from 56½c. to 75c. to (2*s.* 4*d.* to 3*s.* 1*d.*) per lb.

It is not, therefore, worth the while of growers to export their cinchona to markets where, most likely, it would realise less than at home. Foreign cinchona has to pay an import duty of about 2*d* per lb. in Mexico, and quinine about 1½*d* per oz., while the shipping and carrying expenses are very heavy.

Cinchona was first introduced in Mexico by the Emperor Maximilian in 1866, upon the advice of Mr. Maury, a scientist and lieutenant in the United States Navy, who had been making a tour through the South American Andes, and was struck with the climatic similarity of those regions to certain parts of Mexico.

The Emperor Maximilian applied for cinchona seed to Mr Waltham, who had introduced the plant in the East Indies, and received from him a supply of three different species, together with instructions regarding the treatment of the seed.

By the Emperor's orders the seeds were handed to the Geographical and Statistical Society of Mexico, who, in turn, commissioned a Mr. José Apolinar Nieto, of Cordoba, to plant them, and supplied him with the necessary funds for the experiment.

About the same time that these experiments were instituted, Dr. Hugo Fluck, a German resident in Mexico, received from the

late Mr Daniel Hanbury, per post, a small quantity of *Chinchona condaminea (officinalis)* seed, but without any instructions as to its mode of treatment Dr. Finck planted these seeds in the open air, under the shade of trees, with the result that a large proportion germinated, but only three seedlings survived the first season. These three plants have now matured to powerful trees and are still flourishing.

Mr. Nieto, to whom the seeds sent by Mr. Waltham had been entrusted, succeeded in raising a great number of plants which he distributed carefully among intelligent planters. In his own garden he planted several hundred seedlings.

The plants, being treated with every care, flourished exceedingly, some of them flowering and producing good seed after the third and fourth year.

Dr. Finck, in addition to the small quantity of seed which he had received from Mr. Hanbury, procured a large number of seedlings from Mr. Nieto, and planted them, in 1870, on an estate and a farm of his in the neighbourhood of Cordoba, at a height of between 1,800 and 2,000 feet above the sea level. But the mean temperature of these plantations, 75°F, was found too warm, and the plants did not succeed although they attained a height of thirteen to sixteen feet. In 1873 only 115 of the trees survived.

Dr Finck, notwithstanding this disappointing result, remained a firm believer in the feasibility of successful cinchona-growing in Mexico. In 1874 he made a fresh attempt, this time on a "rancho" about 2,900 feet above sea-level, and had the satisfaction to see his efforts crowned with complete success, and to find other planters following his example. At present 12,000 trees are flourishing on Dr. Finck's plantations and it is said that the total number on the plantations around Cordoba is nearly 20,000 A great many varieties have in course of time sprung up from the original three species, and the alkaloidal percentage of the Mexican cinchona is equal to that of the best Bolivian bark.

In Mexico cinchona grows best at an altitude of 2,900 to 3,500 feet, on lightly inclining mountain slopes with a porous subsoil, such as sandstone or conglomerate. Level land, unless it be perfectly well drained, does not suit the trees; they die wherever stagnant water is found.—*Chemist and Druggist.*

AGRICULTURE IN INDIA.

THE following is from an interesting lecture delivered by Dr. G. Watt, C.I.E. before the *Society of Arts.*

India is essentially an agricultural country, the development of its economic resources must to a large extent mean the improvement and extension of its trade in the annual crops moved from its vast alluvial plains. If to it we add the somewhat scanty supply which it possesses of minerals and ores, and the unimportant and wild forests products which we have already discussed—we shall have produced a brief statement of the economic resources of the empire. The prosperity of Great Britain centres around her remarkable wealth of minerials, and ores far more than her rich agricultural fields and industrious farmers. Coal and iron, through steam power, have advanced England into her proud position as the greatest manufacturing nation in the world. Forced by adverse competition with the more productive industries, cultivation has in England given place to sheep farming and cattle rearing, but it is doubtful how far even this will, in the future, prove remunerative. It is quite otherwise with India Coal and iron occur in many isolated regions, but the vast intervening expanses of rich agricultural lands are infinitely more valuable, and so much is this the case that the wealth of India may, with a degree of assurance, be pronounced her agricultural produce, just as the weakness of India may be said to be her indebtedness to other countries to work up and utilise her raw products.

The total area of India has been determined as 1,382,624 square miles and the population as 253,891,821. Although immense tracts of country are annually cultivated, according to the most recent surveys, 100,000 000 acres of land suitable for cultivation have not, as yet, been ploughed. At the same time, 120 000,000 acres are returned as waste lands. There is thus plenty scope for greatly increased cultivation, and should the demand continue for India's agricultural produce, there can be little doubt but that this can be met without narrowing the space required for the food-stuffs of the people.

In my lecture at the Royal Colonial Institute, I endeavoured to show that the wheat export trade of India was a perfectly natural and sound one, and that there was every chance of its extending still further. Wheat has not displaced the crops formerly grown as food, for the people of the soil, since at the same time that wheat has developed, into an important article of trade, the oil seeds have increased 78½ per cent in quantity and 69½ per cent. in value. This remarkable fact can alone be accounted for by a greatly increased cultivation. But when it is recollected that this increased cultivation of oil seeds was coincident with the growth of the wheat trade it becomes evident that immense tracts of land which formerly lay waste must have been thrown under cultivation Everything points to the possibility that, with increased demand, the ploughman will leave the crowded centres into which the Indian people are grouped and spread into the unpeopled tracts until the 100,000,000 acres of rich uncultivated land become gradually diminished. There is, perhaps no problem that has troubled the Government more than the prejudices of the people to leave their villages and take up new lands. A solution of this difficulty is doubtless, however, not far distant for the remunerative export produce trade will tempt them to the regions where money can be most readily obtained, the more so since the prosperity of certain communities will increase the prices to others less fortunate. Where incrative employment may fail to tempt, comparative property will force migration from one part of the country to another. In this way poverty and privation from overcrowding will be mitigated, and the people of India grow richer as their country is made more productive. Perhaps one of the most conclusive proofs of the advantage to India from the wheat trade is to be had in the fact that, while the value of the exports of wheat were last year over £8,000,000 sterling the prices of other food-staffs and of wheat itself have, if anything grown cheaper during the past twenty years. As a positive indication of increasing wealth India is steadily swallowing up large quantities of gold and silver. During the past five years £60,000,000 worth of gold and silver were required by India, and little short of 350 millions' worth have disappeared during the past fifty years. If a still further proof be necessary that agricultural progression may fairly be accepted as a sure indication of increasing wealth, it may be had in the fact the people of India now hold over £20,000,000 sterling of their country's debt. Year by year they are also showing a greater zeal in purchasing shares in railways and other public companies instead of hoarding their gold and silver as in former years.

IPECACUANHA.

As Nilgiri planters did not take readily to the cultivation of the Ipecacuanha root, Government instructed the Director of Parks and Gardens to resume its propagation in the medicine gardens on Dodabet and at Burliar. The indifference of the planter arose from the very limited demand for it and the small price paid. The last mail brings information of an advance of price in Mincing Lane consequent on trouble in south America, the present chief source of supply Twenty-five years ago quotations began to rise, with occasional relapses, but last July it touched the highest figure reached for sound annulated root, namely 14 shillings a pound; and if the troubles alluded to continue, the enchanced price may be maintained. The *Chemist and Druggist* writing on this subject says:—

"The present advance is founded upon the statistical position of the article in Europe, and upon the belief that the cholera epidemic which prevails in the River Plate territories may deprive us of fresh supplies from that quarter for an indefinite period. Unless, however, the cholera should spread to Brazil, which is by no means unlikely, we are inclined to believe that such will not be the case. We rather think that after a few months the root, which under ordinary circumstances would have reached us *vid* Buenos Ayres or Monte Video, will find its way to our market *vid* Rio, the only difference being thus one of trade route. A large proportion of the root now found in commerce is gathered in forests of the Brazilian province of Matto Grosso, forwarded by river to Monte Video or Buenos Ayres and thence despatched to Europe. Considerable supplies also arrive from Rio, but this root we believe is mainly gathered in other districts nearer Rio than the province of Matto Grosso Now, the ipecacuanha shipped by way of the River Plate would be likely to take the Rio route as soon as the market price of the article in Europe would enable the exporters to defray the extra cost of conveyance occasioned by a land journey. part of which only could be effected by rail.

At present Brazil is engaged in isolating her territory as much as possible from her cholera-stricken neighbour, and strict quarantine is enforced against all arrivals from the River Plate The Southampton steamers also, which have been in the habit of calling at different ports along the Eastern coast of South America will for a time cease to touch Monte Video and Buenos Ayres, and the Bordeaux line is partly following suit. It is consequently probable they for some months we shall have to look solely to Rio for our supply of the drug. During late years Rio has indeed been the most important port of shipment of ipecacuanha root, Buenos Ayres and Monte Video following next. In former years we received consignments from Bahia and Pernambuco in Brazil and occasionally but seldom from Carthagena in Columbia. The root shipped from the latter port was collected in the San Luca mountains in Columbia; it is rather stouter than the Brazilian root contains a less brown resin, and yields a much whither alkaloid We are not aware that any consignments of this root have found their way to London recently. The supplies from Bahia and Pernambuco have probably declined because the root has grown scarcer in the vicinity of towns, as the natives collect it in a most careless fashion, and the cultivation of the shrub is entirely neglected. But the plant is a very common one in the forests in the interior of Brazil while its habitat extends over many thousands of square miles, including the greater part of Brazil and sections of Bolivia, Paragnay, and Columbia.

The root is collected in January and February and hung up in the sun to dry a process so imperfectly performed in America, that at times the root reached Mincing Lane in a damaged state. Spurious Ipecacuanha is also not unknown from the same source Some five years ago about 30 cwt unfit for use were received in London and created a stir among Pharmaceutists. London is th

great centre of the trade in this drug, receiving quite 80 per cent. of the entire production the rest going to France, the United State, Russia and Germany.

Its cultivation in India is of very recent date, but experiments already made prove the localities selected to have been well chosen and adapted to its growth. The drug is not so extensively used in pharmacy, at the present day, as it used to be a few years back the more advanced medical practitioners discarding it in cases of dysentery for which members of the old school of medicine, largely prescribed Ipecacuanha.—*Nilgiri Express.*

NATURAL INCUBATION.

It has been well said that it is really marvelous how that in nature every provision is made for the well being of the creatures born into the world. There are no wheels missing in this machine, no methods which we could improve upon, and there is a completeness which puts to shame all the inventions of man. With respect to the formation of chickens in the shell, there appears nothing more wonderful within the whole realm of nature. When we look at an egg we are astonished at its form, its symmetry, its strength but we could never imagine, if we did not know, that the white within the egg contains all the elements for the making of a chicken, and that the application of heat and moisture will produce from it bone, flesh and feathers, all of which need different materials in order that they may be made, and are produced in different fashions and, we could almost say, under different conditions. It must be remembered that by domestication we have altered the conditions of fowls and we therefore, must expect that the same results will not be secured as would be the case under the natural conditions. Too much is, I think, made of the "copying nature" idea. The whole face of things is changed and what would be perfectly suitable in one case is altogether unsuitable in the other. Eggs laid by birds in a wild state (so far as our observations go) seldom fail to hatch. This does not prove that eggs laid by domesticated fowls would hatch as well if set in the same way. It cannot be gainsaid that domestication has had the effect of weakening the constitution while it has resulted in the increase of size in all breeds except Bantams, and in the stimulation of the laying faculty. Careful poultry-keepers do all they can to overcome the weakening of the constitution, in some cases by allowing full liberty, but it appears to be utterly impossible to obtain the same surety in hatching as is found with wild fowls.

In the first place, the eggs themselves are less fertile, for an infertile egg would be a *rara avis* in a wild bird's nest. The cause of this infertility may possibly be due to the larger number of eggs produced by birds in domestication, but it is also due to reduced vigour, then again, a very large number of eggs are lost during the process of hatching by their becoming addled—that i the germ in the earlier of the chick in the latter stages, dies. Such fatality may be due to several causes such as want of strength in the embryo, to improper conditions under which the hatching is carried on, or to want of attention on the part of the hen. One reason why wild birds seldom desert their nests is that they do not commence sitting until the proper season has arrived, and consequently there is not the same risk of changes in the weather. Also a hen knows by her instinct what kind of a place is most suited to her nest. This might at first be thought to point to the conclusion that hens should be allowed to sit where they like, yet we must remember that domestication has enormously increased the number of fowls, and, therefore, what would be best for them in a wild state where the nests are few and far between, is not the best when they are numerous. And again, if we wish to make poultry keeping really profitable it is necessary that hatching should commence early. Therefore, if we permitted the hens to sit just when and where they think fit, it would mean our being too late. Almost every poultry keeper who desires to obtain early stock has to depend upon other than his own yard for brooding hens early in the year, or upon an incubator; for if he relies upon his own stock, unless he keeps a breed that makes sitting the rule of life, he will not be able to secure sitters when he needs them. In this point the letting alone, or so-called natural system, does not work advantageously.

In the sitting of hens there are several things which are essential to success. I do not mean by this that unless they are observed hatching is impossible, for I have known eggs hatch under the most untoward conditions, and in spite of the most disadvantageous circumstances But such a state of affairs must not be reckoned upon. The first essential to success is the vigour and stamina of the stock birds. The dangers of in-breeding have already been pointed out by me, and one of the most frequent results of this close breeding is that very large numbers of the eggs produced are infertile, or the chicks die in the shell, or during the early stages after hatching Many instances could be cited in proof of this contention. Vigour in the stock birds is absolutely necessary if the progeny are to be healthy and strong, and we require strong, healthy, untainted birds upon good runs.—*Neilgiri Express.*

THE MOOR CULTURE EXHIBITON

This exhibition instituted by the Society for the Promotion of Moorland Culture. was opened and closed in Berlin last week. The object of the exhibition—the first of its kind—was to bring before the public the methods and processes it is intended to attempt to bring our moorland into a state of cultivation together with the various implements, machinery, &c., by which these methods and processes are to find application When it is considered that there are 25,000 square kilometers of such land in Germany the greater part of which is utterly worthless it will readily be seen that any means whereby such unproductive land may be brought under (cultivation) and made to yield such field and garden products as the best of our land which has been under cultivation from time immemorial would prove of immense advantage both to individuals and the country and State generally. To say nothing of the extra work which would be afforded to thousands of willing hands the fact of the acquisition to the State of an immense tract of land equal in size to the province of Saxony is one alone of immense importance for it certainly might be looked at in the light of an entirely new acquisition. To attempt to give a detailed report of this most unique exhibition in the space allotted us would be an impossible task and we must content ourselves in the present article by bringing under the notice of our readers a few of the most important points that came under our notice while paying a too brief visit to the exhibition. The first group, and perhaps the most interesting, which attracts the visitor's attention is that containing both deep-ground and surface specimens of the moorland in every part of the country, together with the plants or peculiar products which are found thereon. Here, too, we find the valuable collections of the Agricultural High School, as well as collections from the peculiar provinces of several well-known professors. Particularly noticeable was the magnificent herbarium collection of Professor Wittmack. In the next group were exhibited the various ways and means by which the moorland is to be reclaimed. By the well-known Rimpau process, "dam culture," the sand obtained by the digging operations in connection with the cutting of the drains is spread over the ground—a proceeding which is said to have attained very favourable results. Various other plans and projects for the cultivation of moors by dams are on view, perhaps the most noteworthy being that of the Schweder Techno Cultural Bureau at Great Lichterfelde, whose system has already met with a fair amount of success. After the preliminary preparation of the land comes the manuring. The substance of moorland being of a highly organic nature necessitates the application of mineral matter, and moorland districts are likely to prove good sale spheres in the future for kali salts, tinsel, phosphorite, and Thomas slack. There are here rich selections of every sort of manure, as well as representations of the working effects of the same. The kainite producing salt works as the Stassfurt State works, the Leopoldshall works, the New Stassfurt works in Lederburg, and the Hercynea kali works in Vienenburg have all contributed to a single group of magnificent raw salts, the ground article being also represented. The New Stassfurt works sent besides manufactured manure, while the Thomas slack came from Nienburg, Schalke, &c. Among the Berlin firms represented we noticed the Berlin Steam Bone Dust Manufactory, (Dr. Wilhelm Cohn); Professor Orth also exhibited some manure The manurical effects, however, are principally represented by the show of the Bremen Moorland Experiment Station. But agricultural conversion is not the only method of utilizing moorland; many moors produce that valuable fuel turf, which in spite of coal and lignite is yet thought a good deal of This department of moorland cultivation is not overlooked by the promoters of the Exhibitions and finds representation through the collection of Professor Greiner Turf is put to other uses besides burning; its high absorptive qualities make it peculiarly adaptable as a litter material, and the show of the Gifhorner Turf Bed Manufactory is not the least important one of the Exhibition. Turf also finds its way into the surgery, as certain sorts of wounds and cuts are much benefited by the application of this material. This was one of the exhibits which particularly interested the Crown Prince. Particularly noticeable was the application of the turf fibre to weaving. Mixed with 30 per cent of cotton, wool, or hemp, the fibre of the turf-moss turns out a good yarn, which, as we noticed in Professor Gruner's collection is exhibited in different colors and patterns In addition to what we have already mentioned we find on view various plants and fruits which have been obtained by the applications of the different methods to moorland Among them we noticed giant specimens of the potato, beetroot, &c The machinery department of the Exhibition is not the least interesting. Among other firms represented, we noticed the H F. Eckert, Co., Berlin, Glogowsky & Son, Berlin. Th. Flöther, Gassen, Glaser & Baire, Berlin, Friedrich Hoffmann, Berlin, R Dallberg. Rostock, and Orenstein and Koppel, Brodnitz and Seydel, and C. W. Hall, of Berlin &c. &c. As regards the awards, the first prize is a miniature picture of the Emperor in gold enamel, executed by Bastanier. The court jeweler, Paul Telge, presented for competition a silver cup of the renaissance period, bearing an inscriptive couplet to the effect that he who raises Germany out of slough and moor is worthy of the title of a true hero. There are several other valuable prizes which, however, call for no special comment.—*Kuhlow's Review*, February 23, 1887.

HINTS IN FEVERS.

[BY A PHYSICIAN.]

TYPHOID FEVER.

This is supposed to be due to a germ, conveyed through water from closets, cesspools, or drains. It is not contagious, and is not usual in infants or the aged. It inflames the glands in the intestinal wall, and these ulcerate. The ulceration may corrode till the bowel is perforated. The spleen is increased in size, and the mesenteric glands enlarged. This fever ordinarily lasts from three to four weeks; and in bad cases, even longer Incubation—ten to twenty days.

Symptoms.—It is insidious, and the first symptoms are those of dyspepsia, sleeplessness, languor, *dull pain of the head*, often succeeded by slight delirium at nights, loss of appetite, thirst, nose-bleeding, and diarrhœa. At first (for three or four days) the patient may not go to bed. Great feebleness comes on ; the mind is dull, the face is pale, but the cheeks have a bright, circumscribed flush ; the tongue is coated, red fissured, and dry. There is commonly diarrhœa, with pale ochre or drab-coloured evacuations, of offensive odour and alkaline reaction. The abdomen is slightly swollen, with tenderness and gurgling on pressure above the right groin. A rash appears about the seventh day on the chest and abdomen. There may be as few as four or five spots ; these are rose-cloured and lenticular, last three days, and are followed by others ; they disappear for a moment after gentle pressure with the finger.

In the second week the face is flushed, the tongue becomes dry, cracked, and brown, and trembles when protruded The pulse is frequent. The temperature is probably above 103 deg. Fahr. There is some cough and expectoration, and the patient lies mostly on the back. Hæmorrhage, may occur from the perforation of the bowel. Some delirium may also appear.

The third is the bad week, and the time of most danger The patient lies exhausted upon his back. The tongue is hard and dry, and often covered with a brownish, dark, thick coating, which may extend to the teeth like a skin, and on to the lips Delirium and stupor may supervene. The bowels and bladder act involuntarily. Sometimes the urine must be drawn with a catheter. It is a bad-omen to see the patient sink down toward the lower part of the bed.

Treatment.—This is a disease where good nursing and attention to little things is essential. The patient must go to bed first thing and be kept absolutely quiet. Cathartics must be given with, great caution—if required, an enema, or a small dose of castor oil. If the bowels move more than four times a day one or two of the tablets of Compressed Dover's Powder should be given occasionally. Alcoholic stimulants should not be administered before the end of the second week. "I have formed a very high opinion of the value of turpentine, in doses of M xxv, every four hours," writes Dr. Carter, and the writer can say the same. Sponging with tepid water is grateful, and lowers the temperature. If hæmorrhage occur, Hazeline should be given in teaspoonful doses internally, ice placed over the right groin, and small pieces plunged in tepid water and then crowded into the rectum. The temperature of the room should be about 64° F., and if possible a window in adjoining room should be kept open. Avoid draughts. The excreta should be carefully disinfected with the compressed Tablets of Permanganate of Potash. If the fever run high, Antipyrin Tabloids may be given to an adult in doses of thirty grains hourly for three hours. Delirium and sleeplessness may be controlled by chloral or potassin bromide. Cleanliness and dusting the sacrum with starch may prevent bed sores.

The question of diet is paramount. Solid food may irritate the ulcers, and cause hæmorrhage and a fatal issue. Milk should be given, but always peptonized, as with Fairchild's Peptonizing Powders. No solid food of any kind should be allowed till five or six days after the disappearance of all fever and rash. Solid food in typhoid fever can account for a multitude of death The food should all be peptonized with Zymine. The Burroughs Beef and Iron Wine is a splendid nutrient stimulant, which we commend, as we do also for convalescents that inimitable food, the Kepler Solution of Cod Liver Oil in Malt Extract

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Health, Crop and Weather Report

[FOR WEEK ENDING 24TH MARCH, 1887.]

Madras.—General prospects tolerably fair.

Bombay.—Slight rain in parts of Dharwar. Reaping operations completed in eight, and going on in other districts. Fever and cattle-disease in parts of ten, and small-pox in parts of six districts

Bengal.—Rain in Dacca, Moorshedabad, Dinagepore, Midnapore, and Cuttack. General agricultural prospects favourable. Cultivation of early rice and jute progressing, and in some districts sowing of early rice has begun. *Boro* rice doing well. Indigo is being sown. *Rabi* harvest proceeding with good outturn. Collection of opium going on well, but at Shahabad and Monghyr some damage done by rain and hail on the 13th. Public health generally good.

N.-W. P. and Oudh.—Weather seasonable. Harvesting of *rabi* continues, and prospects are generally favourable. Opium collections in progress. Markets well stocked and prices fairly steady. With the exception of some cases of cholera reported from a few districts, the public health is good.

Punjab.—Slight rain has fallen in the Sialkot, Lahore, Rawal Pindee, and Shahpur districts, but is still much needed throughout the province. Hail fell in Umballa district. Health good. Prices falling in the Hissar, Amritsar, Sialkot, and Lahore districts, but otherwise high and stationary. Crop prospects unfavourable.

Central Provinces.—Weather rather cloudy and hot. *Rabi* harvest continues. Fever, small-pox, and cattle disease in parts. Prices generally steady.

Burmah.—One case of cholera in Rangoon and several in Moulmein and Akyab and in two other districts One case of small-pox in Akyab town; otherwise health of people good. Slight cattle-disease in two districts. Report received from six Upper Burmah districts. Paddy scarce, and prices high in Shwebo; elsewhere supply sufficient and prices normal. Spring crop operations progressing.

Assam.—Weather seasonable, but getting warm during day. Rain in Sylhet and Cachar. Pressing of sugarcane finished. Sowing of *ahu* paddy commenced, that of *dumahi* crops progressing State and prospects of the crops good. Cattle-disease reported from Sunamgunj. General health good, except in Kamalpore, where cholera is reported Prices steady.

Mysore and Coorg.—In parts of the Tumkur district wet crops are withering for want of water; elsewhere crops are reported to be in good condition. Prospects of season fair Public health good. Small-pox and cattle disease prevalent in parts. Prices slightly fallen in Mysore district, and risen in Kolar, Chaitaldroog, and Hassan districts.

Berar and Hyderabad.—Weather warm, cloudy occasionally. Threshing of *rabi* crops in progress. General health of talukas fair. Prices steady.

Central India States.—Weather clear and cool for season of the year. Opium and prospects of other crops good. Cholera continues in Sohawall States, and parts of Rewah and Nagode. Otherwise public health good. Prices stationary.

Rajpootana.—Weather seasonable, though heat less than usual at this time of year; nights cold. Tanks and Wells diminishing generally. Crops ripening. Gram harvested. Prospects favourable. Except in Ajmere, Dholpore and Kerowlee, where small-pox is prevalent, health good. Prices fluctuating.

Nepal.—Rainfall very slight. Fine spring weather. Prospects of crops fair. Prices high.

FOR WEEK ENDING 31st MARCH, 1887.

Madras.—General prospects fair.

Bombay.—Slight rain in parts of Belgaum and Dharwar. Reaping operations still going on in some districts. Fever in parts of seven, cattle disease in parts of ten, and small-pox in parts of five, districts.

Bengal.—Good rain in most districts of Bengal Proper. None in Behar and Chota Nagpore. Calcutta had very heavy showers last night and this morning. Ploughing in full progress, and in some districts early crops being sown. Prospects of *boro* rice favourable. *Rabi* harvest goes on with good outturn. Opium collections nearly finished, and except in Shahabad, a fair outturn generally expected. Public health generally good.

N.-W. Provinces and Oudh.—Weather generally cloudy. Slight showers in a few districts. *Rabi* harvesting going on, and prospects favourable. Opium collections progressing well. Markets well stocked, and prices fairly steady. Cases of cholera and small-pox continue to be reported from some districts; otherwise the public health is good.

Punjab.—No rain fell last week and crop prospects are generally unfavourable throughout the Province. Prices falling in the Amritsar and Sialkot districts; elsewhere high and stationary.

Central Provinces.—Prospects remain unchanged. The harvesting of the *rabi* crops has been completed, except in the Northern districts, and threshing has made considerable progress.

Burmah.—A few cases of cholera in four districts, some cattle disease in two others; public health otherwise good. Reports received from four districts of Upper Burmah. Public health and health of cattle good Spring crop prospects fair

Assam.—Weather seasonable, windy, and rainy. Sowing of *ahu* paddy in progress. Ploughing and sowing of *dumahi* crops continues. State and prospects of the crops good. Six deaths from cholera from Sadr, and 5 from Lakhipur reported. Cattle-disease broken out in Katigora; 83 buffaloes and 213 cows died Otherwise public health good. Land being prepared for sugarcane in Sylhet, where crushing of sugarcane and sowing of *ahu* progressing.

Mysore and Coorg.—Standing crops in good condition, except in parts of the Tumkur district. Prospects of season favourable. Public health good. Small-pox and cattle disease continue in affected parts. Prices slightly fallen in the Kolar district.

Berar and Hyderabad.—Weather clear and warm. *Rabi* crops almost threshed out. Ploughing for *kharif* commenced. *Tabi* crops progressing. General health fair Prices stationary.

Central India States.—Weather Seasonable, but rain much wanted. Prospect of crops continue fair. Cholera still continues at Sohawal, but is decreasing in Rewa State; otherwise public health good. Prices stationary.

Rajpootana.—Week rainless. Nights and days continue pleasant as yet. Tanks and wells decreasing. Reaping of harvest progressing; outturn expected fair, except in two States, where it is poor. Small-pox in three districts, otherwise public health good. Prices fluctuating.

Nepal.—Weather seasonable. Prospects fair.

Letters to the Editor.

MAURITIUS SUGAR.

TO THE EDITOR.

SIR,—"A Planter," who ought to know what he is writing about, sends the following letter to the *Mercantile Record and Commercial Gazette*, published at Port Louis, Mauritius, regarding the alleged use of animal charcoal in the manufacture of Mauritius sugar:—

"My attention has been drawn to a letter published in the *Statesman and Friend of India*, signed by 'one who has been there,' which appeared in your issue of the 7th instant. It is therein asserted that *phosphate of lime, the source of which is bones*, is used by many estates here in the clarification of sugar. I need scarcely inform your readers who know much about sugar-making, that the assertion of 'one who has been there' is altogether inaccurate. 'Phosphate

of lime, the basis of which is bones,' is carefully excluded, and is never employed for the clarification of cane juice or sugar. The only substance used which could give a color to the statement is *mineral phosphate of lime*, the basis of which is certainly not bones. This is one instance amongst many showing how careful people should be of making rash assertions and treating of matters of which they have an extremely superficial knowledge. I trust that in the interest of the sugar industry of the colony, the statement of 'one who has been there,' will be authoritatively contradicted by the President of the Chamber of Agriculture."

It is clear that the good people of Mauritius are very much exercised at the idea of losing India as a good customer for their sugars. The fact that phosphate of lime *is* used for the clarification of sugar in that Island is admitted, but the attempt to prove that the substance is exclusively of mineral origin only makes matters worse, as the writer of the above letter must know that this substance is *not* an efficient substitute for the phosphate of lime obtained from bones, so far as sugar clarifying is concerned. But be that as it may, it behoves Indian sugar manufacturers to bestir themselves and not allow a foreign sugar to run the indigenous product out of the market. A country like India, where labour is so cheap, and the soil and climate so favourable to the cultivation of sugarcane, should be able to *export* thousands of tons of sugar instead of *importing it from such* sources as Mauritius. India should be able to supply the markets of Europe with sugar at a much lower cost than any other country in the world, and in fact take the lead, as she is doing in the matter of wheat.

QUISQUALIS INDICA.

Editorial Notes.

THE Forest Department in the Madras Presidency was last year in the happy position of being able to show a surplus over expenditure of Rs. 2,62,169. This is a very respectable figure, but it was less by over sixteen-thousand rupees than that of the preceding year. It has, however, been decided by the Government that the Forest Department should frame its estimate in future so as to show a minimum surplus of Rs. 2,50,000.

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ACCORDING to a contemporary (we have not yet seen the report) arboriculture under Government supervision in the North-West Provinces and Oudh will soon cost the Government nothing, even if it does not yield a profit. Last year the sums spent under this head were Rs. 52,942, but the receipts amounted to within Rs. 8,424 of that sum. For several years past the receipts have been steadily increasing, as the trees planted years ago are beginning to give some return.

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THERE has been considerable discussion as to the relative value of cooked and uncooked food for agricultural stock, and opinions are pretty fairly divided, but the only safe guide in such matters is to carry out a comparative experiment, and this was accordingly done. The result is decidedly in favour of uncooked food, and the reasons for coming to this conclusion are given at length by Mr. B. F. Ladd, of the New York Experimental Station, whose letter will be found in another column.

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IRRIGATION works in the Bombay Presidency do not appear to be all that is desired, at any rate in the matter of revenue. The total capital expended on such works as were in operation during the year amounted to Rs. 2,14,68,408, and the accumulated balance of unpaid interest and of deficits at the end of last year to Rs. 55,50,743. The earnings for the year, after deducting maintenance charges, were only Rs 72,546, or 0 34 on the capital, and this although the area irrigated was nearly 20,000 acres larger than in the previous year.

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WE note that the horse and cattle show at Ahmednuggur was not a success. The mares exhibited were not so good as in the previous year, and that, though there was an improvement in the young stock, fewer were shown. The country ponies exhibited were pronounced to be worthless, and there are said to be no good ones in the district. The cattle show was also a failure, all classes, except buffaloes and young Malvi bulls, being below the average. On the other hand, the grain exhibits are described as numerous, and of excellent quality. It is suggested that a small economic museum of Nugger products might be formed.

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IN the course of a recent discussion at the Society of Arts Captain R. C. Temple (Editor of *Indian Notes and Queries*), we learn, mentioned a fact which Indian tea-growers would do well to take to heart. The natives of India, said Captain Temple, were very fond of tea, but they liked a peculiar quality which was ascertainable by the people who grew it. He had himself seen in the Kangra district a native owner who made a tea estate pay because he supplied the kind of tea which the people of the Punjab like, whereas the European tea planters did not do this, and while they were complaining that they could not find a market, this native grower was making a good thing out of his plantation.

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THE Western Presidency has made a distinct advance in the matter of agricultural reform, for we are told by a Bombay paper that a company is being formed for the purpose of carrying out agricultural operations in the Kaira district, on an extensive and more profitable scale than they can be carried out by private means. The first capital required is Rs. 2,50 000, to be increased to Rs. 10,00,000. No prospectus has been printed, but the share-list is fast filling privately, chiefly among Europeans. The system of artificial irrigation which has already been tried, and the payment which has been received for the water, have brought out very promising results apart from the quality of the crops and the rate of produce. We shall await with interest the further development of this scheme.

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IT is a "far cry" from the Nilgiris to Dublin; nevertheless the *Weekly Freeman* has received information that the "rat threatens to be as destructive in the Nilgiris as the rabbit is in Australia. The hills are overrun with them. The fields of the ryots are honeycombed by them. On estates hundreds of tea trees have been uprooted by them, and bushels of coffee may be gathered that has been picked by them. Growers of potatoes and vegetables have had their crops destroyed by them, and residents and visitors have experienced what a pest they have become in the houses It is suggested that the breeding of such birds as the eagle, the hawk, and the owl, which prey upon rats, should be encouraged. At present the Nilgherries Game Association offers rewards for the destruction of such birds." We have not heard of the rat being such a plague as one would be led to infer from the foregoing. Perhaps some of our Nilgiri readers will be able to enlighten us.

THE new Governor of Madras, we are told, has had some experience in ensilaging fodder in England, and was present at the opening of a silo in Guindy Park. The pit was simply an excavation in a sandy loam, and filled with a coarse species of grass some five months ago, to a height of two-and-a-half feet above the level of the ground. It had been covered over with earth, and when opened, the grass was found to have sunk over five feet, thus leaving only three feet, of compressed silage which, however, was found to be in good condition, with the exception of a thin layer on the top, which was damaged. His Excellency, we are told, pronounced the silage as in very good condition, but thought that, as it was of very coarse stuff, it would improve by being kept a little time longer. A small quantity was, however, taken out for experimental purposes, and is to be given to horses and cattle after airing and drying, and the silo covered up again for another three months.

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WE gladly find room for the following appeal (received from the Indian Museum) in the interests of entomological science, and hope that those of our readers who devote some of their leisure to entomological research, will add their 'mite' towards Mr. Distant's monograph:—"Attention is called to the accompanying circular from Mr. W.L. Distant, and an appeal is now made for local aid from naturalists towards making the proposed monograph of the family *Cicadidæ*, of the *Rhynchota*, as complete as possible. *Cicadidæ* are easily killed in the ordinary cyanide bottle, and can be sent in camphorated, clean sawdust, moss, or paper, in an ordinary tin or wooden box by parcel post, either direct to Mr. Distant or to Mr. J. Wood-Mason,

Superintendent of the Indian Museum, Calcutta, who will forward them. Mr. E T. Atkinson, who is engaged on the *Rhynchota* of India, will be glad of any specimens of other families of the *Rhynchota* that can be procured ; these also should be sent to the Indian Museum, or to Mr. Atkinson, 15, Loudon-street, Calcutta. As collected they could be kept in spirit until a sufficient quantity is procured for transmission."

RUSSELL HILL ROAD,
PURREY,
SURREY.

DEAR SIR,—As I am preparing a monograph of the *Cicadidæ* of the Indian and Indo-Malayan Regions, under the auspices of the Indian Museum, Calcutta, I am anxious to make the work as complete and exhaustive as possible, and for that purpose am desirous of receiving specimens belonging to this family of insects. Every species will be figured, and every acknowledgment made to the donors, in the work. The family is little worked, and so it is safe to rely upon new species being easily collected,

Yours faithfully,
W. L. DISTANT.

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WE regret to learn that the Punjab is threatened with scarcity, if not famine. The crop and weather reports from the varous districts are very unpromising indeed The Lahore paper states that, with the exception of the irrigated parts of the Ferozepore and Mooltan districts, all the reports are bad ; Rawal Pindee, where the estimate is "average," being the best of! Next comes Jullundur, where the report is only " very indifferent." In the Delhi and Umballa districts the state of the crops is " unfavourable." In Umritsar, Mooltan and Dera Ishmail Khan, they are "suffering for want of rain" In Peshawar " very poor" ; in Sialkot, " injured by continual winds ;" in Lahore, simply " bad" ; in Shahpore, " drying up for want of rain" ; and finally, in the unirrigated parts of the Ferozepore district, they are described as " deplorable," The fall of temperature of the last few days is, however, as far as it goes, a favourable sign, as indicating broken weather approaching from the south. Unless rain, and a good deal of it, comes soon, great suffering is assured.

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THE trade returns of the Punjab for the last quarter of 1886 show a markable falling off, and no explanation is forthcoming to account for it. The *C. and M. Gazette*, in noticing this, says :—" Both imports and exports decreased, but the fall in exports was altogether out of proportion to that in imports, and quite unaccounted for by the ordinary fluctuations of trade. During the last quarter of 1885, the total amount of exports was 7,574,107 maunds, whereas in the corresponding quarter of last year it reached only 1,578,561 maunds A very large proportion of the decrease is under wheat, the exports of which from Kurrachee alone have fallen from 4,065,392 maunds to 146,256 maunds. Such a fall as this implies a heavy loss and is without a parallel in any other province in India. The Financial Commissioner's office might with advantage have attempted some explanation" Our own idea is that the 'office' was either unable or unwilling to give the required explanation The falling off in the exports of wheat was phenomenal, and is a subject for grave consideration.

ACCORDING to the Sourabaya *Courant*, a chemist at that city has, for some time, been busying himself with seeking to find out some means of destroying white-ants, especially on shipboard and in enclosed premises. At length, finding what was sought, he made experiments with his invention in the presence of several naval officers with such striking results that the local Navy-yard authorities took measures to secure the granting of 2,000 guilders for the purpose of trying the remedy on a grand scale on board some unserviceable man-of-war swarming with white-ants. The Government so far fell in with the suggestion that a man-of-war coming under the specified conditions has been set apart for the purpose, along with the amount applied for. White-ants have wrought such havoc among men-of-war in Netherlands India waters, that it is in the interest of the Marine Department there, that the experiment on foot should be crowned with brilliant success. The discovery will be very welcome in India ; where this pest is very destructive.

THE *Madras Mail*, in an article on the working of the agricultural department in that presidency, urges that what is wanted is something practical ; and it is at all events satisfactory to find the Government negativing such proposal as that of the Board of Revenue that a treatise on the plant diseases and parasites of this country should be compiled. "Theoretical administration has, so far, mainly characterised the Agricultural Department. The reservation, 'mainly,' is made because there is one branch of the department which is acknowledged to be practically and satisfactorily worked. Much useful work continues to be done in the way of cattle-disease inspection and treatment, and it is to be hoped that financial pressure will not be brought forward as an excuse for refusing the appointment of an inspecting veterinary officer to supervise the local cattle-disease inspectors in the districts. This is a branch of the administration which the ryots appreciate ; and the importance of preserving as far as possible the agricultural stock of the country cannot be overrated." *The Madras Mail* evidently does not recognise the connection between plant diseases and bad crops ; but we do, and a treatise on the subject would be the very best thing that could be undertaken for the guidance and instruction of the Agricultural Department.

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THE *Standard* states that a great public meeting of agriculturists from all parts of the West of England was held at Bristol recently to consider remedies for the present depressed state of agriculture. Lord Fitzhardinge presided and was supported by several members of Parliament and prominent agriculturists. Mr, Paynter, of Essex, delivered an address upon the condition of agriculture, suggesting remedies. He appealed to agriculturists not to allow themselves to be crushed any longer, and asked farm labourers, farmers, and landlords to combine in one large association. If they united in such an association they could rule the county, constituencies and many of the town ones as well, and keep out of Parliament any men who would not vote for the remedies proposed for relieving agricultural depression. A resolution was carried to form a branch association of the West of England to co-operate with a national association for amending the present depressed condition of agriculture. Another resolution was agreed to, urging upon the Legislature the desirability of a thorough re-arrangement of their present fiscal laws.

IF adulteration of milk by the *gowallahs* was punished in a similar manner to that reported below in the *Standard*, there would be rejoicing in many Indian households :—" George Yeates, milk dealer, carrying on business at the Terrace, Lordship-lane was summoned, at the Lambeth Police-court yesterday at the instance of Inspector Stevenson, on behalf of the Camberwell Vestry, for selling milk found to be adulterated with added water to the extent of 15 per cent—Mr Chance ordered a penalty of 30s., and 12s 6d. costs.—Richard Woodhams, of Goodrich-road, Crystal-palace-road, milk seller, was also summoned by the inspector for a similar offence. The certificate of the analyst showed there was added water to the extent of 20 per cent—Mr. Chance imposed a fine of 30s. and 12s 6d. costs There was a third case—*viz.*, Frederick Barker of East Dulwich-grove, the milk in this case having eight per cent of added water.—Mr. Clayton, barrister, argued upon various points of law with regard to the case, but these were overruled by his worship.—The defendant was called, and on oath said he did not put any water in the milk. He sold it as he received it from the dealers.—Mr Chance, after hearing further arguments by the learned counsel, ordered the defendant to pay a fine of 15s. and 12s. 6d. costs.'

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SOME idea of the wheat production of California may be formed from the fact that, according to information received from San Francisco, the quantity of wheat available for export on January 1st, 1887, was over 27 million bushels. It appears that the estimates of the present season's crop, which, six months ago, were as high as 60,000,000 bushels and over, still widely differ, some persons asserting that it will be 40,000,000 bushels, while others, equally competent authorities, are positive it will not exceed 30,000,000. As the closest calculator leans towards the lower figures, the estimate of the crop is here

placed at 34,000,000 bushels. The old crop on hand on July 1st amounted to 2,000,000 bushels, which with the present season's crop of 34,000,000 makes a total of 36,000,000. Deduct shipments to Europe and other countries between July 1st and December 15th, 14,000,000 bushels ; quantity that will be shipped between December 15th, and December 31st, 1,500,000 ; required for home consumption, seed and to carry over, 11,500,000 ; balance available for shipment, 9,000,000 bushels. "The Continent this year, says an American Exchange, has taken twenty five per cent of our European shipments—something unheard of before. Last year, during the same period, it took only 3,000 bushels. Our shipments to Europe are considered large, because they are compared with those of last year which were unusually small. This accounts for the impression that California has such a large crop this year."

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MR. H. H. HAAFF, the originator and advocate of the practice of de-horning cattle, attended a Wisconsin farmers' Convention held at the State capital recently, at the invitation of Professor Henry and others connected with the State board of agriculture. A hearing was arranged for him says the *Farmers' Review*, in the assembly hall, the legislature adjourning for that purpose. "The hall was packed to its full capacity. Of course his theme was de-horning, which he illustrated by specimens of skulls minus horns, and horns minus skulls. Professor Henry's published experience in de horning had prepared the way for a favourable reception of the plan, and judging from the reports of the meeting in the Madison papers, Mr. Haaff seems to have carried everything before him, fully four hours having been taken up by his speech, and subsequent reply to quentions, before the meeting was willing to disperse. There can be no question but de-horning has come to stay, and at no distant day will be generally practised, but upon young calves instead of grown animals " the wearers of horns having meanwhile all disappeared."

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A CORRESPONDENT, who is not satisfied apparently with Mr. Maries' letter published by us a week or two ago, regarding trees suitable for growing on saline soils, asks a number of questions on the subject, among them the following :—(1) What were the other species of tree tried by him ; (2) What were the chemical constituents of those trees, as well as of the "rain-trees" after having been grown on the saline soil mentioned ; (3) What quantity of nitrate of potash did they absorb from the soil ; and (4) among the other trees tried, were there any plants of *Parietaria officinalis* and *Salsola kali*. With regard to the second and third questions, it may safely be said that Mr. Maries will not be in a position to give replies unless he has a chemical laboratory at hand, and has been in the habit of carrying out experiments in chemical analyses. As to the fourth query, it is only necessary to mention that *Parietaria officinalis* is a mere weed, belonging to the nettle order (*Urticaceæ*), and found growing mostly on old walls and stony ground, as its generic name implies, (Latin *paries*, a wall), and would, therefore, not be of much use on a soil impregnated with saltpetre, this substance not being used in mortar for building purposes. The *Salsola kali* is a hardy British sea-side weed, a foot high, of the order *Chenopodiaceæ*, and being native of an English climate, would hardly, we think, thrive in a climate such as Durbhunga possesses We fear our correspondent has got somewhat "mixed." However, we hope, the foregoing information will meet his queries. The importance of Mr. Maries' discovery does not lie in his having found certain trees to *grow* upon saline soils, but in the fact that, the "rain tree" is capable of *exhausting such soils of their saline properties*, and rendering them fit to raise cereal crops upon where none would grow before.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the weeks ending 24th and 31st March, 1887:—In the latter half of the fortnight under report rain fell in most parts of Madras, Bengal, and Assam. Slight falls have also occurred in a few districts in the North-Western Provinces and Oudh, the Punjab, and Burmah. Elsewhere the country has been rainless during the period under report. The *rabi* harvest continues in most parts of the country, and has been partly completed in Bombay, the Central Provinces, and Berar. Prospects are generally good, except in the Punjab, where the state of the crops is unfavourable, owing to the want of rain. In Rajputana harvesting has commenced in a few States. The standing crops are generally fair in Madras, though in some districts blight and want of rain have caused slight damage to the crops. In Mysore and Coorg the outlook is satisfactory. The prospects of the spring rice are favourable in Bengal, and sowings for the early rice have commenced in Assam. The collection of opium is in progress in Bengal and the North-Western Provinces, and a fair outturn is expected, except from Shahabad, where the crops were damaged by hail. The prospects of the crops in Central India and Rajputana are fair. Cholera and small-pox are prevalent in parts of Madras, Bombay, Bengal, the North-Western Provinces, and Burmah ; but generally the public health is good. Cattle-disease exists in some districts in Madras, Bombay, Bengal, and Assam. Prices are still high in the Punjab, though they are falling in the Umritsar and Sialkot districts. Elsewhere they are steady.

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THE following is a summary of Messrs. Stenning, Inskipp and Co's Indian and Ceylon Tea Report, dated London, March 10th, 1887 :—Common qualities of Indian tea being in large supply, continue to show weakness at rather lower rates than a fortnight ago. The better grades are steady at unaltered prices. The deliveries for February are satisfactory, being for Indian 6,887,000lbs., and 495,000 for Ceylon, or together 7,382,000lbs., as compared with 7,234,000lbs. of China Congou and Souchong (including export about 2,000,000), whilst export included, the average delivery of these sorts for the past six years has been 9,500,000lbs. during February. It is also worthy of note that the delivery of Indian and Ceylon tea for the 9 months to end of February shows an increase of 10,750,000lbs., or exactly equal to the increase in imports during the same period. We have from time to time pointed out the necessity there is for large breaks, so that the number of sale samples of each day's teas may be within the compass of buyers for tasting and valuing. This point will become more than ever important during the approaching season, when larger supplies, many in small breaks from the new estates in Ceylon, will be offering.

				(Estimated)
The exports from Calcutta, 1st May to 28th February, 1887	...	...	...	74,500,000 lbs.
Do.	Do.	Do.	1886 ...	65,000,000 ,,
The exports from China for the season to 28th February, 1887	...	...	...	149,000,000 ,,
Do.	Do.	Do.	1886 ...	150,000,000 ,,

Larger quantities of Ceylon tea of less satisfactory quality, and the depression of Indian makes have combined to cause a decline all round of from 1*d* to 2*d*. per lb. : teas of good quality are, however, not so much affected. We would call attention to the great proportion of small breaks lately offering ; this will be damaging to the interests of growers as supplies increase. The 5,744 packages offered realized an average of 1*s*. per lb., as compared with 1s. 2*d*. per lb. on this date last year.

The export from 1st October to 15th Feby, 1887,	is	2,717,669 lbs.	
Do.	Do.	Do. 1886, ,,	1,462,863 ,,

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THE uses to which the cocoanut can be put are many and varied, and it is very properly regarded as one of the most valuable trees of the tropics. Indeed, in Ceylon and the Malayan archipelago, there are few trees that meet so many wants of man as the cocoanut. It is not generally known that the cocoanut produces a pearl almost identifical in every respect with the product of the pearl oyster. We are indebted to a Java journal for the following particulars regarding this peculiar kind of pearl :-

It is well known that pearls are met with in oysters and mussels. Sometimes even trees yield pearls. In the proceedings of the Boston Society of Natural History there is a paper by Mr. J. Bacon regarding a kind of pearl often found formed with in cocoanuts. The specimens shown have been bought at Singapore. They are said to be so rare in the East Indies as to be highly prized by the native rajahs, and worn by them as precious stones. Mr. Bacon himself possessed a small pearl of this sort. It is said that when allowed to grow, they will reach the size of cherries. This pearl

ables the common variety in smoothness, whiteness and scant e of surface. It is harder than it, and almost as hard feld-spar or opal. The common pearl varies in hard-. but is never harder than feld-spar. The cocoanut pearl con- of carbonate of lime, with very few organic substances remain- after treatment with acid solutions. This organic matter is uble, and shows no trace of vegetable substances after micros- ial examination, and seems to be akin to albumen in structure he common pearl there is also found an albuminous substance, he latter remains unchanged in appearance and lustre even the calcareous constituent parts have been dissolved away, her respects microscopical research has brought out the fact the cocoanut pearl is formed of concentric layers with- any nucleus. The whole mass is made up of layers of crystalline fibres. Professor Bleekrode in commenting on ormer in a Dutch scientific periodical, says that Rumphius, mous botanist, had in his "Herbarium Amboneuse" given full culars of this petrifaction in the cocoanut. Rumphius has even rated his account of it by accompanying drawings of the two in which this kind of pearl is met with—pear-sh ped and l, either of uniform appearance or with red edges. Hardly one housand cocoanuts on the averages displays this strange pecu- y The formation of the lat er is always a remarkable pheno- n hard to account for from the water in the nu's generally g the chemical substances favouring abnormal growth of the Rumphius states for a fact that cocoanuts from Macassar yield pearls than those from other places. This scientist in 1682 as present to the Grand Duke of Tuscany a ring in which a nut pearl had been set. Similar pearl-like formations are met in other East Indian fruits such as the waringin, the pome- te and the kechubong.

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E Rev. James Doyle, of the Madras Irish Mission, sends ollowing interesting particulars to *Indian Engineering*: ding the cultivation of arrowroot in the Southern Presi- :—" I am sending you a sample of arrowroot grown and factured at Place's Gardens, Kilacheri (Chingleput) by the Father Dominic. Judging from the results of the primi- methods adopted by him, both in the cultivation and pre- ion of the tubor, I should say that, as an industry, ed on scientific principles and with mechanical appliances, root should prove largely and surely remunerative- "eyes" from which his last crop was raised, were put at a foot apart, in the month of July last year, the d having been first prepared as for a crop of *ragi* merely; ubsequent treatment of the plants did not differ mate- from that of this hardy cereal. The tubers were dug November-December, and averaged twelve inches in , with a diameter of 1·5 inches at their head. Only a quantity was unearthed each time, as he believes that ibers deteriorate by exposure to the air; and, accordingly, were divested immediately of their sheaths. washed and ed to a coarse pulp in a stone mortar with a wooden . A portion of the pulp was now put into rthen vessel, and washed in a large quantity of , and the washings were poured into a second vessel gh a wire gauze sieve, and allowed to settle. At the some ten minutes, the top water was carefully poured off cond vessel, fresh water poured on the settings, and after whole had been well stirred, the result was strained into a vessel through a piece of muslin, and left to settle a l time. At the end of another ten minutes, the water ssed off also, and the farina was discovered at the bottom hite, firm, moist mass, and was taken out and spread on white sheets to dry. The residum of each straining was ed to the first vessel, and treated a second, and occasion- third time as the original pulp, before it was thrown As only a very small quantity was grown and manu- ed last year, I have made no attempt at calculating the per acre. But I found from a single day's observation 8lbs. of the raw material gave very nearly 4 lbs. of dried This also represents the work (from digging to drying) e men. Their wages at two annas a head was the only ntial charge in this quantity." The sample sent was d to an expert, who pronounced it to be as good as any- of its kind now produced in the country. This fact to induce others to attempt the cultivation of this tuber rge scale.

MR. D. SMEATON ON THE INDIAN WHEAT TRADE.

ITERATION sometimes becomes irksome, but upon a question fraught with such important consequences to this country as the wheat trade, we should be wanting in our duties as a journalist if we allowed any such minor considerations to outweigh our sense of the injury that is being done to the country, by the action of the shippers of wheat from Indian ports to the London market. We have already pointed out that it is not the cultivator or the middleman who is responsible for the adulteration of wheat exported from this country, but the large European firms both in Calcutta and Bombay, who purchase in bulk from up-country traders, who in their turn buy from the cultivators. Mr. Donald Smeaton, the Director of Agriculture and Commerce in the North Western Provinces and Oudh, before leaving to join his new appointment in Burma, has submitted to the Government a very important Memorandum upon the wheat trade of India, a document which leals exhaustively with the question, and which entirely bears out our own views upon the subject. Although Mr. Smeaton considers that, according to the system of cultivation at present followed by the Indian ryot, "refraction" on account of adulteration and dirt cannot as yet be altogether abolished, he nevertheless thinks that it need never exceed two-per-cent. And this suggests the question why it should be necessary to deduct from 5 to 6 per cent. as at present. The answer is obvious, and is to be found in the fact that the shippers, both at Bombay and Calcutta, cannot bring themselves to forego the profit which this excessive deduction for refraction yields, no matter how pure the grain may be. It has become an established custom, and no argument of the cultivator will convince them that the grain supplied can be anything but adulterated to the extent of five or six per cent. The result is that the cultivator does his very best to outwit the shippers, and generally succeeds. From information supplied to us by a private, but authentic, source, we gather that, owing to this pernicious system, the grain sold to the up-country trader is adulterated to the extent of from *seven to ten-per-cent*, and that the cultivator and middleman (the up-country *trader*) have made common cause to circumvent the avarice of the shippers. To such an extent is this trickery and fraud practised, that the grain used to adulterate the wheat for export is sometimes *unfit for human food!* Mr. Smeaton cites a case in point, which more than bears out our own information upon the subject. It appears that about the middle of last year the agent of a well-known Bombay European firm, stationed at Mozuffernagar, had some wheat which was seized by the Magistrate and sent to a medical officer for inspection, who pronounced it *unfit for human food!* When questioned, the agent admitted that he was unable to supply wheat to his firm, unless he mixed old grain with the new in the proportion of about 1 to 10; and the correspondence produced by the agent before the Magistrate went to show that the firm in question had *examined and approved samples of this abominable mixture!* It further transpired that the old grain used for mixing had been purchased at 33 seers per rupee, at a time when good wheat was selling at from 16 to 18 seers per rupee. When large and respectable European firms stoop to such discreditable practices, is it expected that native traders will be less scrupulous in their dealings? and, it may be asked, is it possible under such circumstances for Indian wheat to compete with the American product with any prospect of success?

Since writing so far, we have read with much satisfaction a powerful article in the *Pioneer* on this subject, which we have reproduced in another column. The writer after citing the Mozuffernagar case, says: "Obviously, so far as considerations of trade are concerned, there is nothing to forbid the conclusion that the primary blame for the demoralization that at present discredits the wheat trade, rests with the merchant-exporters; but did we know nothing of cases like that at Mozuffernagar, the conclusion would yet stand, for had the exporters not set up a refraction of 5 per cent against knowledge, the wave of dirt and adulteration would never have swelled up to its present height." We entirely agree with the writer that it does not follow that because two years ago the Calcutta Wheat and

Seed Association failed in the attempt to reduce the refraction from six to five per cent during a certain portion of the year, and were boycotted by the upcountry dealers. the fault of the present system lies with the cultivators, or even with the middlemen. Mr. Smeaton on the contrary suggests—truly, we have no doubt—that the action of the dealers was in all probality prompted by a previous painful experience of the attempts made at Calcutta to extort excess refraction; and a knowledge of this abuse night become more intolerable with a low, than with a high refraction. The remedy proposed by Mr Smeaton is the establishment of an independent authority at the ports, composed of a Committee of mercantile men, and aided by an expert appointed by Government. This authority, he thinks, will be the only one acceptable to the up-country dealers to determine all points connected with refraction and classification of the wheat. Mr. Smeaton would not, however, empower this authority to fix the standard of refraction, in so far as relates to the degree of purity which may ordinarily be expected in Indian wheat; but thinks this can only be done by a representative of the London merchants—*i.e.*, those who import the wheat. But how this is to be done, we do not clearly see. The London firms have doubtless come to regard adulteration inseparable from Indian wheat, and would doubtless not be willing to pay for a lower rate of refraction: but we think, with the writer in the *Pioneer*, that it is hard to believe that London merchants, if they received the pure samples and *bona fide* assurances of the Indian Chambers of Commerce, would be difficult to convince that pure clean wheat *can* be got in India by paying a slightly higher price for it. These are important considerations, and we urge them on the attention of the London as well as Indian firms. It is simply monstrous that one of the most important branches of the trade of India should be ruined by the unscrupulous devices of interested parties, and this, too, at a time when it is beginning to attract attention in Europe.

Mr. Smeaton's Memorandum also deals with other questions of importance, such as the methods for cleaning the wheat and cheapening of its transport after leaving the cultivator's hands, and the help which District officers can give in improving the agriculture of the country generally, which deserve the attentive consideration of all who have the welfare of Indian interests at heart. We hope to return to the subject next week.

NITRATE OF SODA IN THE GARDEN.

This substance now forms a very important element in the manuring of lands cultivated with garden crops; but how to use it, in what proportion, and upon what soils, are questions which require to be well considered before attempting its use. We have now been reproducing some very able papers by "Cambuslang" published in the *North British Agriculturist* upon this subject, and a fourth letter by the same writer appears this week in another column. In America its importance has been recognised, and Mr. Joseph Harris, an authority on the subject, writes as follows in the March number of the *American Agriculturist* in reply to a correspondent who asks how to use nitrate of soda in a "sandy, 'leachys' oil and where it must be used in a liquid form as a fertilizer for tomatoes peppers, &c":—

On such a soil it will not do to depend on nitrate alone. You should use just as much other manures as you would if you did not intend to use the nitrate. In growing tomato plants, pepper plants egg plants &c., in the house, we use nitrate of soda in the water with remarkably beneficial results We have used an ounce of the nitrate in a gallon of water without injury, but took the precaution to syringe or sprinkle the plants copiously with pure water immediately afterwards, for fear that such a strong solution might injure the foliage. No harm, but much good, followed the application. We generally use the nitrate in weaker solutions—say one-quarter to one-half ounce in a gallon of water; and in the case of young rapid growing plants in the house, repeat the application every week or ten days. Perhaps one word of caution may be necessary If the soil in the posts or boxes should be very dry, it would be safer to water first with ordinary water say till the soil was half saturated, and then finish with the water containing the nitrate; or if this is not done use a *very weak* solution of nitrate, say one-eighth of an ounce to a gallon of water. The soil may be completely saturated with such a solution without injury. In regard to using nitrate of soda on out-door plants, we seldom use it in the liquid form. We sow it broadcast on the land either before the plants are sown or set out, or afterwards while the plants are growing, and if possible before or during or after a rain. We do not see why the same plan could not be adopted in California The only difference is that we look to the clouds for water and you furnish it artificially. If more convenient, the nitrate can be dissolved in the water. But if at the rate of one ounce to the gallon, which is as strong as we have used it, to put on 500 pounds per acre, you would require 8,000 gallons of water per acre. Why would it not do to sow the nitrate broadcast on the land as soon as the rainy season was over and while the soil was saturated with water? As a rule the dryer and hotter the season the more benefit do we get from the use of nitrate of soda on our crops.

The same writer has gone exhaustively into the question in the columns of another American journal (the *Rural New Yorker*), and this is what he says:

There is a common opinion that the longer onions are grown year after year on the same ground the better will be the crops. Enormous quantities of dung are applied every year. The manure used supplies nitrogen, phosphoric acid, potash and other ingredients of plant-food far in excess of the amount removed in the crop. And yet it is found necessary to furnish a heavy dressing of manure every year. If this is not done the crop is found unprofitable. The same is true of early cabbage and early cauliflowers. It is found necessary to use enormous quantities of manure for these crops—far in excess of the plant-food removed in the crop. Gardeners who make a specialty of growing large areas of early cabbage, find it a most impossible to make the land rich enough the first year. They find that the second or third crops grown and manured every year on the same land are better and earlier than the first crop. An experienced American gardener recommends an application, every year, of 75 to 80 tons of stable manure per acre for early cabbage, and ten tons per acre for late cabbage. Many gardeners make this distinction between early and late cabbage, and yet the late cabbage produce much the larger crops and remove far more plant-food from the soil than the early crop.

A market gardener near New York who used large quantities of manure and was very successful, was about to open a street through his garden. Thinking his land sufficiently rich to carry through a crop of cabbage without manure, he thought it useless to waste money by using guano on that portion on which the street was to be, but on each side sowed guano at the rate of 1,200 pounds per acre, and planted the whole to early cabbage. "The effect," says the well-known gardener who relates the incident, "was the most marked I ever saw. That portion on which the guano had been used sold readily at $12 per hundred or, about $1,400, per acre, but the portion from which the guano had been withheld hardly averaged $3 per hundred. The street occupied fully an acre of ground, so that my friend actually lost over $1,000, in the crop by withholding $60 for manure. Every gardener of exprience can recall similar instances. Recent scientific discussions furnish a satisfactory explanation of these facts, and the explanation is of great pr actical importance. There's no difference between the manurial requirements of an early and a late cabbage Both require the same food, and the late crop, being larger, requires more rather than less food or manur per acre. And yet in practice it is found absolutely necessary t use far more manure for the early crop, than for the late crop The explanation is this—All our common agricultural and hor ticultural plants take up their nitrogen in the from of nitric acid or nitrate. At one time it was supposed that the plants took up th nitrogen in the form of ammonia. It is now known th the ammonia must be converted into nitric acid. N matter how much nitrogen the soil or manure may co tain, it becomes available for plant-food only after it is convert into nitric acid The 75 tons of manure that gardeners appl every year for the early cabbage contain 820 pounds of nitroge or as much nitrogen as 5,200 pounds of good commercial nitrate soda. Ten thousand early cabbages per acre, weighing five poun each, is a good crop. These cabbage (25 tons per acre) contain 1 pounds of nitrogen equal to 750 pounds of nitrate of soda. In oth words, the gardeners use over six pounds of nitrogen in the fc of manure to get back one pound of nitrogen in the crop. And long as they use nitrogen in the form of barn-yard and st manure it is undoubtedly necessary to use this quantity. T find it profitable to use it, but thanks to the investigation scientific men, we now know how to obtain the same results far greater certainty and at vastly less cost. The 75 ton manure contain 820 pounds of nitrogen, but little or no nitric ac And it is nitric acid that the plants want and must have.

It is now known that the nitrogen in the organic matter of the soil in manure is slowly converted into nitric acid by the growth of a minute, living plant. This plant cannot grow if the soil is too cold or too wet, or too dry, or in the absence of lime or an alkali. As a general rule there is no lack of lime in the soil, and the other conditions necessary for the conversion of the nitrogen into nitric acid are warm weather and a moist soil. In the early spring the soil is too wet and too cold for the change to take place. We must wait for warmer weather. But the gardener does not want to wait. He makes his profits largely on his early crops. Guided only by experience and tradition he fills the land with manure, and even then he gets only a poor crop the first year. He puts 75 tons more manure the next year and gets a better crop, and another 75 tons the next year and gets a still better crop. And he may keep on putting on manure till the soil is as rich in nitrogen as the manure itself, and even then he must keep on manuring, or he fails to get a good early crop. Why? The nitrogen of the soil, or of roots or plants, or dung is retained in the soil in a comparatively inert condition. There is little or no loss. But when it is slowly converted into nitric acid during warm weather the plants take it up and grow rapidly. Unfortunately, however, if we have no plants growing in the autumn, and there is much nitric acid left unused in the soil, the rains of winter and early spring leach out a large proportion of it, and sinks into the sub-soil or under-drains.

How, then is the market gardener to get the nitric acid absolutely necessary for the growth of early plants? He gets it, as before stated from the excessive and continuous use of stable manures, and even then he fails to get it in sufficient quantity. Five hundred pounds of nitrate of soda will furnish more nitrogen to the plants early in the spring than the gardener can get from 75 or 100 tons of well-rotted stable manure. The stable manure will furnish nitric acid for his later crops, but for his early crops the gardener who fails to use nitrate of soda is not living up to his privileges.

THE CHRYSANTHEMUM.

(Continued from last week.)

Cultivation in the Open ground.—Those who have been in the habit of growing the chrysanthemum as a pot plant in this country, frequently entertain doubts as to the practicability of obtaining good-sized, well-shaped blooms by any other treatment. For my part I must confess that I prefer growing them in pots and even when intended to flower in the open grround, I plant them out from the pots after the plants have become well filled with buds The open ground cultivation of the chrysanthemum, however, is not only practicable, but is attended with much less trouble than when grown in pots, and a considerable saving of the labour and expense entailed in frequent potting, watering, &c. These are points of much importance to the amateur gardener, who is often not prepared to give that watchful attention that plants in pots always require, and without which failure must inevitably follow; on the other hand, plants in the ground when they have once become established may be left almost to themselves, provided they are well supplied with water and plenty of rich food, though of course it must be understood that the more carefully and liberally we treat them the better will our labours be rewarded. Cuttings should be struck at the same time as that recommended for pot-culture, in a cool, partially shaded situation; the soil should be dug to a depth of 12 inches and a liberal dressing of old manure and leaf mould added. Insert the cuttings about nine inches apart each way keeping them carefully shaded until they have taken root, which they will do freely enough in about ten days when they may be gradually exposed to the air and sun, keep the plants well supplied with water to induce a vigorous growth, but if they have been planted in a good rich soil, they will not require any other stimulant at this peroid. By the end of April or beginning of May they will have formed strong plants ready for transplanting into the quarters in which they are to be grown. Having selected the spot upon which it is intended to grow the plants, the ground should be well dug over to a depth of at least 18 inches in order to enable the roots to get well down and thereby avoid drought. Give a good dressing of manure—not too rotten—working it well in when digging, and then tread the whole firmly to avoid sinking. After the plants are put out mark out the ground in double rows, leaving between the rows a space of at least two feet to afford a free passage between them. This will facilitate the operations of tying, disbudding, &c., and will enable the grower the more readily to secure earwigs and slugs, both of which are very fond of chrysanthemums, and must be kept in check by constant watching and trapping. Draw out the soil in the double rows to about 6 inches in depth, and after a good watering proceed to plant about 12 to 18 inches apart A good stout stake should be attached to each plant, which must be allowed to grow without check, with the exception of pompones, which may be stopped once or twice during the season. Water them frequently both night and morning during dry weather, not only at the roots, but also drench the foliage thoroughly. As soon as the rainy season sets in it will be necessary to see that the beds are effectively drained; as, if the soil becomes at all water-logged, the plants invariably succumb. After August frequent doses of liquid manure may be given with advantage, but this can only be applied in dry weather. It often happens that just at the season when the plants require the most liberal treatment, the state of the weather will not admit of anything being given them in a liquid form; when this is the case, a very good plan is to cover the entire surface of the beds with a layer of about two inches of half rotten manure. If it be desired to grow handsome specimens with fair-sized flowers as well, the plants should be stopped until from eight to twelve stems are obtained according to the variety and strength of each plant; each stem so produced being allowed to grow on and to bear a single flower only. Search the plants carefully for green fly at regular intervals; this pest is sure to appear sooner or later, the best remedy is a solution of soft soap and tobacco water. Great care should be taken that the solution is not too strong, or the young shoots will be injured, and it is always better to repeat the dose frequently than by one overdose, and thus risk the year's prospects. The health of the plants is much improved by syringing them after a hot day, and indeed the surface of the ground all round them should be kept moist in dry weather. An occasional syringing with weak soot water is very beneficial. Mildew must be looked after; it is very liable to make its appearance when the weather is wet, It generally commences its attacks at the tips of the leaves, gradually spreading over them both above and below. Immediately it is discovered, sulphur should be at once applied, and thoroughly dusted on the parts affected, repeating the dose as required.

In the chrysanthemum we have a plant of such a hardy enduring nature, that it not only grows, but may be said to flourish amid soot and dust, if now and then it is washed from its leaves, as there it is mildew does the mischief by stopping the breathing pores. If those who live in and around towns and cultivate chrysanthemums or indeed almost any other plant, only knew how important it is that they should be kept free from dusty deposits, their success would be much greater than it now is; as when the respiration of any plant is impeded, its whole system becomes disorganized, as would be the case with ourselves did we suffer in the same way. The leaves are to them what lungs are to us, and it is therefore obvious that if they become clogged in any way, it is at the expense of their health This being the case, those who would have them thrive should not fail to give them a good drenching overhead at least two or three times a week during dry weather; if they do this, the return will be a far superior display of bloom and plants in such a condition as to be a real pleasure to look upon. This watering overhead is almost of as much importance as a supply of moisture at the roots, especially if the plants are growing near dusty roads or where the atmosphere is not clear and pure, as it seldom is in the vicinity of large towns where chrysanthemums are perhaps more appreciated than anywhere else In applying water to cleanse the foliage, it is best done through a good syringe, as then it can be used with some considerable force Failing this, a good shower from the rose of a watering pot will answer the purpose, but however carried out the washing should be thorough, as a slight sprinkling would only aggravate the evil by moistening the dusty deposit and making it stick all the faster The reason why we so frequently see chrysanthemums in the naked shabby condition they are at the time they should be looking their best, is either from want of sufficient moisture or over-crowding.

RUS IN URBE.

Miscellaneous Items

THE nett Indian sea and land customs revenue, exclusive of the salt revenue, for the first eleven months of the current official year, was Rs. 1,00,05,000, as compared with Rs. 94,65,000, during the corresponding period of last year

THE quantity of wheat exported from the Central Provinces rom the 1st of October last up to the 19th of March was 812,442 bags of 2½ maunds each, as compared with 960,046 bags during the corresponding period of last year. There was a slight decrease in the quantity of rice exported,and a very large decrease in linseed, while on the other hand the export of tilseed increased largely.

IT is the idea of Sir William Armstrong to cultivate all his arable land by a combination of hydraulics and electricity. This he intends to do by means of a fixed electrical engine, charged by means of revolving magnets actuated by water power. This machinery is being erected, and is so far advanced that it may be in actual working order before the Royal visit to Newcastle, veritably ploughing the land by means of the electric spark.

THE latest reports from the indigo districts continue favourable. Rain has fallen over some factories in both Northern and Southern Bengal, which has done good to the spring sowings and also to the October plant. In Behar the weather has been favourable, although in Chupra the nights have been rather cold, which has somewhat checked the growth of the plant; it has otherwise done no harm, and the re-sowings, which have not been on an extensive scale, are doing well.

THE *Pioneer* remarks on the fact that the imports into India of tea from Japan, China, and Java, for transhipment up the Persian Gulf or despatch by rail to the North-West Frontier, have increased within the last five years by 41 per cent. and amounted in 1885 86 to no less than four million pounds; and suggests that were the Indian growers to depute agents to visit the markets of Persia and Afghanistan, and report on their capacities and requirements, it would almost certainly pay them.

PLUCKING of tea has been going on in most of the gardens in the Dooars and Darjeeling Terai for some time, and a few musters have been already received in Calcutta, but it is too early at present to pronounce any opinion as to the quality. In Assam the weather had been favourable, and "tipping" has been commenced on a few gardens. Hailstorms are reported from Kachar, Sylhet, Darjeeling, and the Kangra districts, but with the exception of a few estates the damage has been inconsiderable. The latest reports from Chittagong are good.

HOP statistics compiled in Munich in November show that the world's production of hops in 1886 has been 1,823,700 cwt. of 50 killogs., towards which Germany contributed a good average crop of 623,900 cwt. German consumption being 364,000 cwt., there will remain 259,900 cwt. to be exported. The Austrian crop was 97,600, that of Belgium 114,000 and France, 52,000, while in England 625,000 cwt. were secured The European crop being about a good average, all would be satisfactory but for the partial failure in the United States, where consumption amounts to 270,000 cwts, at the lowest, and production in 1886 has not exceeded 230,000 While the world produced, as has been stated, 1,823,700 cwt., its consumption for the year is estimated at 1,655,000, leaving an excess of production of 168,700 cwt, or about 10 per cent. Instead of exporting to England, as the United States usually do, they will be importers this campaign.

WHILE the legislation respecting ordinary medicine and pharmacy is undergoing revision, says the *Chemist and Druggist*, veterinarians are having their claims to legal recognition favourably considered. M. Dovelle, the Minister of Agriculture, France, has presented to the lower House a Bill to regulate the practice of veterinary medicine. Its provisions in brief, are that—1. Within a year no one shall practise as a veterinary surgeon unless he has a diploma of one of the French veterinary schools. 2 All those who have been practising veterinary medicine for five years before the enactment of the law shall be allowed one year to pass an examination before a board composed of two veterinary doctors and one agriculturist, 3. Foreign diplomas may be recognised by the Minister of Agriculture, upon application of the holder, if the Minister shall be satisfied that the diploma presented is an evidence of qualifications equal to those exacted by French schools. 4 and 5 relate to details of administration; 6 enacts that veterinary surgeons shall not keep open pharmacies, but may only prepare and deliver their own medicines. They must besides observe the laws and regulations touching the sale of poisons. And, lastly, there are various fines of from 16f to 400f, as penalties to enforce the law.

AT the annual meeting of the shareholders of the Hansford Land and Cattle Company (Limited) held in Dundee recently, reference was made to the very serious losses which had occurred amongst their cattle last winter, owing to the destructive storms and low prices. The Directors advised the reduction in the value of the shares from £5 to £3 because on the basis of a reduced capital the near possibility of dividends can be entertained, and the value of the shares would correspond with the results attained. Good reports have been received from the ranche. Branding was still going on and the cattle were looking well for the season.

ON the subject of testing eggs, *La Nature* says:—"We recommend the following process for finding out the age of eggs, and distinguishing those that are fresh from those that are not. This method is based upon the decrease in the density of eggs as they grow old. Dissolve two ounces of kitchen salt in a pint of water. When a fresh-laid egg is placed in this solution it will descend to the bottom of the vessel, while one that has been laid on the day previous will not quite reach the bottom. If the egg be three days old it will swim in the liquid, and if it is more than three days old it will float on the surface and project above the latter more and more in proportion as it is older."

A SOMEWHAT vexed and an exceedingly interesting point has recently been determined by a discovery, in the Wellington Caves, of some remains of the long extinct Australian lion. The bones in question are now in the Mines Department's Museum, Philip-street, and they consist of several very complete jawbones, containing the teeth in an excellent state of preservation. Prior to being set out for exhibit, they were submitted to the inspection of Professor Sir Richard Owen, of the British Museum, and his opinion is that the animal was a marsupial (pouch-bearing) lion, fully equal in size to the now existing African species. Discoveries of leonine remains have at various times been made in this colony, and also in Victoria, but the specimens in question are remarkably well preserved They have been excavated from post-pliocene deposits, and in connection with them were the remains of what are known as the "Tasmanian tiger" and the "Tasmanian devil" An equally interesting fact is that Professor Owen, when years ago referring to the herbivorous characteristics of the Australian diprotodon, expressed his firm conviction that some large carnivorous animal must have been co-existent with him to keep the race in check, and that probably lions then inhabited Australia—a hypothesis which has since been fully verified.

THE *Railway Age* has compiled statistics in regard to the railway building in the United States during the past year showing that in 1886 more miles of track were laid than in any preceding year except 1881 and 1882. The number of miles is 8,010, and if the average cost per mile was $20,000, these tracks represent an expenditure of more than $160,000,000 for roadway alone. The greater part of the work has been done in the Northwest and Southwest, Kansas leading the States with 1,520 miles, and the four States of Kansas, Nebraska, Minnesota and Texas, with the Territory of Dakota, taking more than half of the new mileage. Many new enterprises have been planned or undertaken, and it is the opinion of the *Railway Age* that if the present favorable outlook for business shall be justified, the coming year will show even greater mileage of new track built than in 1886. The same paper says in another article that if the yearly statements of railway foreclosure sales are a barometer of the condition of railway property, the record for 1886 is a most appalling. During the past year no less than 45 railways, with 7,687 miles of main line, representing a bonded debt of $170,149,500 and a capital stock of $203,969,200 making a total of nearly $374,110,000 have been sold under foreclosure and transferred to new ownership. The Mileage is double that of any year in the past decade, except 1879, and far greater than in that year, while the stock and debt total is far larger than in any other year, and nearly 50 per cent more than in 1885

A CORRESPONDENT of the *Gardeners Chronicle* sends to that journal the following interesting account of an ant-catching orchid (*Eria Stricta*):—"Few people would be inclined to enumerate an orchid in any list of insectivorous plants, yet the little plant which is the subject of this note is such a confirmed ant-catcher that the circumstance deserves to be recorded, though it would hardly be correct to describe the plant as insectivorous. Of dwarf and compact habit, it bears erect distichous spikes of numerous small white and very woolly flowers, the spikes much resembling those of our British Spiranthes Autumnalis. The flowers measure nearly two lines long, the sepals and petals, which expand but very little, being about half this length. A plant in the Kew collection is now bearing several spikes of flowers, many of which appear black in the centre and on closer examination this is seen to be due to the presence of a small black ant The flowers secrete a drop of liquid at their base which is perceptibly sweet when applied to the tongue. This serves as an attraction to the ants, but on crawling in to sip the nectar their front legs and antennæ become glued to the viscid stigma and there they literally starve to death. So efficient is the trap that on one small spike, with fifteen expanded flowers no less than eight ants were captured. On examining the plant it was seen that several flowers had captured a couple of these unfortunate little creatures, and that in several instances they were alive and making most strenuous efforts to escape, but all to no purpose. They come to suck the nectar secreted by the plant for the delectation of those insects (whatever they may be) which fertilise the flowers, but being themselves unfitted for this purpose and not being strong enough to get away, they pay the penalty of meddling with things too high for them with their lives. Such is fate."

Selections.

THE CONSTRUCTION OF THE HONEY-CELL:

OR,

THE BEE AND HIS D. P. W.

BY A. EWBANK, M.A.

I

THE geometry and construction of the bee cell requires at one point of the discussion the assistance of the Differential Calculus But there are many interesting features which can be described in the language of more elementary mathematics, while others can be described in ordinary untechnical speech, and even the differential calculus can be removed from its one function if we choose to imagine ourselves obtaining by experiment and by a series of trials what the calculus gives us by theory. Therefore this discussion will be intelligible throughout to readers whose mathematical studies were ended with simple trigonometry, and much of it will be intelligible without any mathematical knowledge whatever. That purely geometrical problem for which the aid of the calculus, if not indispensable, is still very appropriate, is not here published for the first time. Probably many mathematicians working independently, have assured themselves that the shape of the bee-cell has the curious property of being most economical of wax under certain pre-assigned conditions. But the greater part of the discussion to which I invite the attention of the readers of this journal will contain ideas and reasonings which I believe to have been now for the first time published, and now for the first time thought out.

When an insect—that has six legs—requires a home to sleep in or a nest for its young, or a treasure house to store up food, he may look about for some such accidental hole or crevice as in the trunk of a tree, or in rocky ground, nature may already have provided. In such a case geometrical considerations are not particularly studied. The place must be large enough to hold whatever it is required to put there. The next desideratum is that the entrance shall be as small as possible. For in this case the existence of the hole is the less likely to attract attention from predatory wayfarers. Should the hole be observed then the smaller the entrance the more difficult it is for a large robber to get inside, and the easier it is for the lawful tenant to defend himself and his property against an equally small but more heavily armed assailant, Given a spacious chamber approached by a narrow and not easily noticed passage, the insect may readily put up with any other inconveniences which may attach to the place It may be damp and its tender young may get colds on their chests —or it may be badly ventilated and the insect may creep out in the morning languid and half asphyxiated. But as there are humans as the Americans say) who will readily endure all sorts of discomforts rather than give themselves the trouble of honest methodical labour so there are insects that seem to have as little proper pride in the appearance of their houses or in the management of their children.

For an insect of this loafing description an unused keyhole provides a sumptuous mansion. The entrance is narrow and it cannot be enlarged by predatory teeth working at the outside Once within the lock we find a suite of rooms as comfortable as heart could desire. We know that humans (Anglo-Indian or otherwise) coming to a new station are often prone to take as a matter of course the good things provided for them, with perhaps much difficulty, by their predecessors, in the way of racquet courts, tennis courts, baths, &c. It is to be feared that some insects are equally thoughtless and ungrateful. But, to a reflective female insect who comes on a keyhole which indicates by subtle dust indications, that it is not used by other creatures, it must seem that the carpenter who devised that structure was animated with much benevolent foresight for the needs of his future lady tenant. In one of its convolutions she can curl herself up for a sleep, In another she finds a chamber naturally adapted to an expected "interesting event," A third is a ready made larder where she deposits that tender remaining half of a young caterpillar which she captured in to-day's shikar. It is reserved to the morrow's early breakfast for the damp morning air is good for no one upon an empty stomach.

When an insect of either sex can find no crevice handy, or when he (or she) has methodical ways and is not averse from honest labour then an appartment is duly built and it is naturally built *round* The chamber may be altogether as nearly round, so as to be spherical, or domelike, with a flat floor—or it may approach the shape of a cylinder whose axis is horizontal and here the roundness applies to the cross section All that we have said about six legged beings applies equally to four legged beings and to bipeds either feathered or featherless. In all cases an animal naturally prefers to have as much roundness as possible. One cannot turn conveniently in a place where there are sharp corners. Thus we see that the untutored human—when he wants one chamber for himself, or for himself and his squaw and his children—makes his habitation round and calls it a hut or a tent. If subsequently he takes to building *barracks* he may modify the round shape for obvious reasons. But we are dealing with primeval impulses and we can verify them in ourselves Ask any man to dig you a hole in a field and give him no instructions about the shape or the object for which you require it He will not make the hole of the coffin shape—that is roughly rectangular and longer than it is broad— nor will he make it roughly square. He will make it a rude o role

But to bipeds quadrupeds, or six-legged creatures there comes a time when individual enterprise is replaced by something approaching the limited liability company. Now when men or insects wish for the sake of mutual protection, or of co-operative advantages to built huts or store houses, in close proximity they find that the round shape involves two disadvantages One is that space is wasted. Another is that material is wasted. There may be another disadvantage, This we will call the Engineering disadvantage. I mean that as each cell or chamber touches its neighbours only at points or lines *i, e* small areas, they do not lend each other that mutual support which the awakening intelligence of the "Construction Department" may see to be desirable.—*Indian Engineering*

COOKED VERSUS UNCOOKED FEED.

BY B. F LADD, N. Y. EXPERIMENT STATION.

THE question, whether raw or cooked food is the more valuable for our domestic animals, is of considerable interest, and sufficient has now been put on record to make possible a comparison of the result obtained. Armsby, in his "Manual of Cattle Feeding," says; "A portion of the advantage claimed from cooking and steaming foods undoubtedly arises from the fact that the fodder is eaten while still warm, and thus a certain amount of substance of the animal, which would otherwise be burned in warming the food, is rendered available for other puposes." He futher says: "All the experiments hitherto executed show that the digestibility is not sensibly increased thereby."

Stewart in "Feeding Animals" quotes the following: "It is not claimed that the steaming of food adds to its nutritive elements, but as pulverization and stirring of the soil promote the growth of plants by making the plant food more accessible, so the steaming of food makes it more palatable and more readily digested and assimilated by the animals." The experiments upon *which this statement* is based do not seem to warrant this conclusion.

Professor Stewart gives an interesting experiment with six pigs, in two lots Lot 1 was fed-cornmeal soaked twelve hours in cold water; Lot 2 was fed cornmeal throughly cooked and fed lukewarm. The experiment lasted 100 days Of cooked meal 2040 pounds were consumed; and of soaked meal 2,111 pounds, and the gain in the given time was 666 pound on the former and 420 pounds on the latter In other words for one pound of increase in weight 3 06 pounds of cooked meal were required and 5 02 pounds of soaked meal.

It is evident that this experiment cannot be considered in the comparison between raw and cooked feed, although it has often been quoted has evidence in suchcomparison It does show in that instance that warm cooked meal was more valuable than meal soaked for twelve hours and confirms what others have found in similar experiments. German experimenters have found that of dry hay steamed hay and hay moistened with the same amount of water as was used in steaming, the moistened hay has the least value and dry hay the highest.

The published details of the experiments of Professor Miles I have never seen, and can not, therefore, consider them. Neither have I seen the detail of the experiment by Sir J. B. Lawes on this question, but in the abstracts of a meeting at which he was present, I find it stated that the uncooked food was fed to the cattle in October, when they were just in fresh from ranging the *grass, and the more successful feeding, with cooked food*, was made in March, after they had been in the yards sometime and were accustomed to the position and diet. This difference may be enough to account for the entire extra gain.

Unfortunately there are a few of the most trustworthy experiments on this point to whose data I have not had access.

Among the earliest tests in this country upon the point and question was one made at the Maine State College Farm, and extending over a period of nine years. In 1876 the superintendent opens his report thus. This experiment has been tried for seven successive years with the same result as far as the values of raw and cooked meal have been compared' In the trial for that year which lasted nine months three pigs were used No. 1 during the first four weeks was fed on cooked meal. No 2 and 3 received raw meal for the same period. For the second period of four weeks Nos. 2 and 3 received cooked meal and No 1 the raw meal, and so they were alternated in feed every four weeks. There were fed during the six periods of four weeks each of cooked meal 995 24 pounds The gain on the first was 184 5 pound, and on the last 196 5 pounds. That is of cooked meal 563 pounds were required to make a pound gain in weight, and of raw meal 506 pounds. In other words this long trial showed that 100 pounds of raw meal would give much gain as 111 pounds of cooked meal For the entire nine years the relative value of cooked meal to raw was 83 3 to 100,

Professor Henry, in the report of the Wisconsin Experiment Station for 1886, gives the result of feeding four lots of three hogs each, and the experiment lasted twenty-one days. Lot I. was fed one part shorts and two parts shelled corn, thoroughly cooked by steaming Lot 2 was fed two parts shorts and one part shelled corn thoroughly cooked. Lot 3 was fed the same mixture as lot 1, but uncooked. Lot 4 the same as lot 3, but uncooked.

The result was that for one pound of gain lot No. 1 required 6·05 pounds of feed, No 2 5 23 pounds, No. 3, 4 91 pounds and No. 4, 4 57 pounds. The advantage in each case was with raw feed.

In another carefully conducted experiment, in which Professor Shelton fed ten pigs, half with cooked and half with uncooked corn, 7·5 pounds of the cooked food was required for a pound of increased weight, while only 6·3 pounds of uncooked food yielded the same gain

We find in the average for these trials it has required 0 86 pound more of the cooked feed than of the same material feed raw to produce a pound of pork. What is the reason for this? A chemical examination of the cooked material shows that in some cases there has been a slight loss of albuminous material, and that the remaining albuminoids have, in part, been broken up into compound, considered less nutritive than in their former state; and, further,

the food is less digestible after cooking than before, although it may be more palatable in some cases. Again, the cooked food being moist is not so thoroughly masticated as is the raw, and less saliva mixed with it before being swallowed. An examination of the excrement always reveals considerable undigested material when cooked food is fed, that is not found when raw material is used.—*Farmers' Review.*

GIRDLING TREES FOR FRUIT.

By Prof. J. L. Budd.

The *Fruit Grower*, published by Chas. A. Green, of Rochester, N. Y., is commercial in character, hence it finds its way westward by the sack-full. In the last number the following note appears:—

"Professor Budd writes: A Mr. J. B. Spaulding, of Illinois, has practised ringing for fruit for years past. His plan was at first to girdle every other tree, but he now treats all alike. He rings in the latter part of April, taking off a ring of bark from the stem one-half inch in width entirely around the tree, taking care not to injure the cambium layer under the bark. He begins to girdle when the trees are but six years old. So far he has found no harm in the process. The gain is that it sets them to bearing at once, and they bear full, too."

This is followed by a sharp criticism. "Yes," he says, "they bear full. I have seen trees girdled by mice that were loaded with nubbins heavy enough to satisfy the most ravenous grower, but the trees died young. Just how to girdle a tree and not injure the cambium layer is not stated, and seems to be a delicate operation. I am opposed to girdling and advise all readers not to thus mutilate their trees." All of this, and much more of the same general tenor, is unfair and intended so to be. We have never recommended indiscriminate girdling of fruit trees to bring them into bearing, and have never advised girdling in any form for the States east of Lake Michigan. Possibly, at some time. I have used nearly the words quoted in regard to Mr. Spaulding's extended work in girdling trees, but always in connection will be found the advice to confine the operation to such refractory varieties as Yellow Bellflower, Perry Russet, Wallbridge, and often the Tetofsky, when growing on rich drift prairie soils. We have tens of thousands of Walbridge trees in Iuowa of large size to-day which have never borne a peck of apples to the tree. Every one of them should be carefully girdled about the middle of next June. If they do not blossom and hold their fruit the succeeding spring, girdle them again in a new place.

If the operation is successful, and in nine cases out of ten it will be, the operator will find that this kind of girdling does not bring the "nubbins" that Mr. Green speaks of in connection with the girdling by rabbits and mice, but it will bring an abundant crop of nice fruit.

That it might shorten the life of the trees to some extent is probable, but the wound soon heals over, and if not repeated too often it does not specially lower the vitality of the tree. At this time Mr. Spaulding's great orchard at Springfield, Illinois, looks quite as well as those of his neighbours which have not been girdled, yet his pockets have been well filled with orchard proceeds when theirs, during the recent trying seasons, have been mainly empty.

Yet we do not recommend girdling such varieties as Duchess Wealthy, Roman Stem, or father south, such as Ben Davis, Jonathan, Dominie, Grimes, Golden, or anything else that bears in a respectable way at proper age. But the varieties of apple, pear and cherry, which fail to set fruit on our rich soils, even when they blossom freely, should be girdled year after year until they come into bearing. To illustrate the mode of doing the work, and its results, the following example is given. A friend pointed out two trees of Tetofsky standing on rich garden soil, of large size, which he said never bore but two apples. We said: "Why don't you girdle them to-day." "I will," he replied, "if you will show me how."

It was then the 10th of June, and of course the bark peels freely. A ring of bark three-quarters of an inch in width was taken off entirely around the stem about one foot above the ground. He said he thought it would kill the trees but to-day the only trace of the operation is a roughened break in the bark of the stems; but the whole expression of the tops of the trees was changed. Prior to the operation the trees had a growthy, forest tree expression. Now the annual growth is short and the branches are lined with fruit spurs. The year after the ringing, the trees were loaded with fine fruit, and they have not failed to bear a fair crop since.—*Farmers' Review.*

CANNEL COAL FOR EUROPE.

A new departure in the coal business has recently been inaugurated, whereby this country will henceforth furnish Europe with a large share of the cannel coal used there, instead of importing for our own use from the other side, as has hitherto been the custom. This is reducing the old saying about "carrying coals to Newcastle" to an every-day fact! The facts are that very valuable and extensive deposits of cannel coal that have long been known to exist in Kentucky, but never developed to any considerable extent have recently passed into the hands of an English company that will at once commence to operate the mines on a large scale. An English steamer has just taken a shipment from New Orleans, where 2 000 tons had been stored for this purpose. Mr D. M. Yeomans, of London, who is largely interested in the enterprise, is in this country personally supervising the operations. He says that the cannel coal of Great Britain is pretty much exhausted, For the past five or six years the gas companies of Great Britain have obtained their cannel coal from Australia, but the prices have reached such a height there that they became practically prohibitory The Kentucky coal was tested by coal companies in London, Liverpool and Glasgow and found to be of a high order, and that it could be shipped to Europe at a remunerative figure. Fifteen to eighteen dollars a ton is obtained for the coal in England, to which country 10,000 tons have so far been sent. It is expected that 50,000 tons will be sent there annually.

The London Gaslight and Coke Company uses over 100,000 tons of cannel coal a year. Its total consumption of coal exceeds 10,000 tons a day. The cannel coal is used entirely for lighting purposes. The mines have furnished it for American consumption, it being used by all the companies in New York and Mobile, Charleston, Savannah and other Southern cities adopting it. The mines were first developed some thirty years ago for the manufacture of oil. Natural oil made the factory unprofitable, and it was abandoned. The works were destroyed during the war, and the place has been lying idle ever since. Since the syndicate was formed, two years ago, a village has been built up there, which has been named Victoria, in honor of England's Queen. One hundred miners are employed, and the works are in charge of Graham McFarlane, a Scotchman. The syndicate is styled the Breckenridge Coal Company, limited, capital £500,000, with head-quarters in London. The company has put £500,000 into the enterprise, and will increase the capital when the project is in complete shape.

Mr. Yeomans has visited coal properties in Kentucky, Ohio and and elsewhere and found no coal that impressed him as favorable as the Breckenridge County product. The coal is mined in very large blocks, different in form from any shipped heretofore. It makes 15,000 cubic feet of 45 candle power gas to the ton.—*Foreign Trade Gazette.*

TABASHEER.

[*Indian Forester.*]

I wish, through the medium of the *Indian Forester*, to draw the attention of my friends and former colleagues, as well as of younger forest officers in India generally, to this remarkable substance, because the study of its formation may possibly lead to important results concerning the life history of the large bamboos, in the hollow joints of which it is deposited. Its great, and I may add unmerited fame as a medicine, this substance has received mainly through the writings of the old Arab physicians, particularly of Razi + 923, and of *Ibn Sina* + (better known as *Avicenna*) 1037. But the name is of Sankrit origin, *tavakhshira*, *tavakhshira* meaning milk in the skin.

The oldest detailed account of this substance known to me, is contained in a letter from Dr Patrick Russell to Sir Joseph Banks, dated Vizagapatam, November 26, 1788, printed in Vol 80 (1790) of the *Philosophical Transactions* of London. He notices the erroneous account given by Arab writers of its origin through the burning of bamboo stems, especially of such as have suffered from fire kindled by the friction of the reeds one against the other, an accident, he adds, supposed to happen frequently in the dry season among the hills, and he mentions that in the Latin versions of Razi and Avicenna, tabasheer is constantly but erroneously rendered by *spodium* (ashes) He adds, that the mountaineers, referring probably to those of the Vizagapatam district, say, they never look for tabasheer in the half burnt fragments of the bamboo. Here I may mention at the outset, that the erroneous notion, that tabasheer is obtained from the ashes of bamboos, is still current in books in Europe. Tabasheer was also formerly confused with sugar; this error, however, was cleared up by Rumphius (Herbarium Amboinense, IV, 11). He says that the *sugarcane* has been confused with the bamboo and sugar with tabaxir, also called Sachar Mamboe. Rumphius wrote his large and excellent work about 1690, and it was published in 1750. Colonel Yule, in his delightful book, "A glossary of Anglo-Indian Words" (1886) enters fully into this interesting question, and shows the absurdity of the idea, which has long been entertained, that the saccharon of Greek and Roman writers was not sugar, but the siliceous concretion sometimes deposited in bamboos (pages 654 and 675.)

The account of Dr. Russell's own researches forms the most interesting portion of the papers After mentioning that, tabasheer is only found in the joints of the female bamboo (in this case probably *Bambusa arundinacea*), he explains that on shaking the bamboo, a rattling noise indicates the existence of tabasheer in large pieces, and that these are bluish white, like fragments of shells, but softer in substance In other cases there is only a rough friable white or cinereous powdery substance adhering to the inner wall of the joint.

In April he examined a bamboo of six joints received from Vellore (probably the place on the Palar river west of Madras is meant). On splitting it, no vestige was found in two joints; these were discolored within. The whole quantity collected amounted to 27 grains, and the largest quantity was obtained from the two middle joints. A small portion, about four grains, consisted of bluish white solid pieces, but soft; the rest was cinereous and friable.

In July, 37 bamboos were split out of a large quantity of green bamboos each containing 5 or 6 joints, which had been brought from the hills 50 miles distant from Vizagapatam. In nine of these no vestige of tabasheer was found, the remaining 28 yielded small quantities, in the aggregate not much exceeding 2 drams (54 10/16 grains). The substance was never found in more than three joints of the same bamboo, and the empty joints were sometimes contiguous, sometimes interrupted. The white smoother and harder particles adhered to the septum and to the sides at the ends, never to the middle. Instead of being chiefly found at the lower extremity of the joint, as might be expected from the sap settling there, they were found adhering indifferently to either extremity, and sometimes to both, forming a smooth lining, somewhat resembling polished stucco, generally cracked in several places, which

could readily be detached with a blunt knife. In some joints the tabasheer was thus collected at one or both extremities only, and in such no rattling was perceived, but generally, while some adhered to the extremities of the joint on the inside, other detached pieces were intermixed with the coarser loose particles in the cavity.

Tabasheer has been repeatedly analysed. In one point all analyses agree, that it chiefly consists of silica, the proportion varying between 70 and 90 per cent. with a small quantity of moisture and organic matter. The other principal substances are lime and potash, but their proportions seem to vary. (See Turner's Analysis of Tabasheer, *Edinburgh Journal of Science*, XVI. 335, and T. Thomson, quoted on page 257 of the *Pharmacopœ of India*). The silica, lime, and potash were doubtless originally held in solution in the sap, which is taken up by the roots from the ground. The sap which fills the cells of the growing bamboo-shoot, holds these inorganic substances in solution, together with sugar, gum, and other organic substances which have been elaborated by the action of the leaves. As the shoot grows older, cavities are formed in the joints, and in these cavities some of the sap collects from the surrounding tissues. The existence of this watery fluid in the hollow joints of the bamboo is well known to all who have spent some time in the bamboo forests of India and other tropical countries.

There is little doubt, that tabasheer is the residue of this fluid, but it is not clear how it is formed. In any case, however, the fluid in the hollow joints is intimately connected with tabasheer, this seems also to have been Dr. Russell's view of the process; and accordingly he paid attention to the fluid found in the joint of the bamboo. The existence of such fluid, he observes, may be known by the sound when the joint is shaken. He never found fluid in more than two joints of one stem, and never in large quantities, 1½ ounces being the largest amount obtained from one stem. He adds, that the fluid always had a slightly saline and astringent taste, that it was always transparent but varied in color and consistency. Some of a darker color had the consistency of honey, some on the other hand was perfectly colorless but nearly dry. Both kinds, he says, had the sharp salt taste of fresh tabasheer.

Dr. P. Russell also mentions, that in the bazars of Hyderabad two sorts of tabasheer are sold, the best at one rupee a drachm, the inferior kind at half that price, the latter consisting chiefly of burnt teeth and bones. A Parsee informed him, that tabasheer was produced in great quantities in Sylhet, and sold there at Rs 1 to 1 8 per pound, also that it formed a considerable article of trade from Bengal to Persia and Arabia.

A later volume of the *Philosophical Transactions* (for 1819), contains an important article by Sir D. Brewster on the very remarkable optical and physical properties of tabasheer. In that article Brewster mentions also, that Humboldt discovered tabasheer in the bamboo which grew to the west of the *Pinchiach* in South America.

About 10 years later Sir David Brewster published in No. XVI. of the *Edinburgh Journal of Science* additional observations on the natural history of tabasheer, together with some remarks on the subject by Dr. Wilson, at that time Secretary of the Asiatic Society, Calcutta, who speaks of it under the Bengali name *bans-lochan*. In the Calcutta market Dr. Wilson says, three sorts are sold. The best is called *Patnai* because it is brought from Patna, small solid pieces of milky white color and half transparent. This kind is also called *Nilkanthi* on account of its bluish color, and *Paharika*, because it is brought from the hilly country west of the Ganges. The second sort is white, dull, and friable; neither shining nor transparent; it is called *Chhelata*, and is supposed to be brought from Sylhet. The third and least valuable kind is called *Desi*. Regarding the first kind (Paharika) Dr. Playfair at Hazaribagh wrote to Dr. Wilson that it was obtained from the hilly country of Chota Nagpore, 6—100 miles from Hazaribagh and from Palamow. It is found in the small hill bamboo under which I suppose we must understand *Dendrocalamus strictus*, and out of 50 or 60 plants only five or six yield it. A stem contains as a rule 4-5 grains and very rarely it happens that 40—50 grains are found. The same stem often yields the three kinds, the best which is shining and bluish white, the second sort white like chalk not shining, and the third brown and sometimes even black. The raw material sells at the rate of 10 Rupees a seer, but after it has been prepared for use the same quantity costs 40—50 Rupees. This preparation consists in heating it in a crucible of clay and maintaining it at red heat for some time. When heated the *bans lochan* at first becomes black (by the carbonization of the organic matter which it contains), but after the organic matter has been completely consumed, the substance becomes white again after cooling. One-and-a-half ounce of the natural tabasheer treated in this manner, yield one ounce of the prepared substance.

Sir David Brewster expresses a remarkable view regarding the formation of tabasheer. He thinks that it must be the result of a disease in the bamboo, of a disorganized state in the transverse walls which separate the joints. He adverts to the statement made by an intelligent native of Vizagapatam, that the walls of these joints which contained tabasheer are always perforated by holes made by an insect, but adds correctly that tabasheer is often found in joints which have no such holes.

The conclusion to which he had arrived, seems to be that the sap is collected in the transverse wall which separates the joints and that when the tissue of the wall gets diseased or when the membrane which clothes the inside of the joint is injured, the sap which holds the silica in solution filters, through into the joint and on drying up leaves the tabasheer.

The remainder of the paper is devoted to an account of the remarkable physical qualities of this substance, which it would lead too far to reproduce here.

The editors of the German periodical, in which the translation of Brewster's papers is published* (Journal fur Chemie and Physik, Vol. 52, 1828) adds some further information regarding tabasheer. A green bamboo, grown in a conservatory near London, was found to contain a small hard round pebble in one of its joints, of a dark blackish brown color. Again it has been reported by Dr. Moore (*Edinburgh Journal of Science* IV., 192) that concretions similar to tabasheer were found in the nodes of a large kind of grass between "Nagpore and the Circars."

These are the most detailed researches published, and I will now give a brief account of the statements made by other authors on the subject of tabasheer.

Rheade (*Hortus Indicus Malabaricus* Vol. I, 25) merely says: "stipites hujus arboris (*Ily, Bambusa arundinacea*) cum vetul: tiores sunt, aliquo genere calcis in cavitate obducuntur, quae usu medico servatur."

Rumphius, (*Herbarium Amboinense*, Vol. IV. 10,) mentions that the younger stems of bamboos contain in their lower joints a colorless fluid fit for drinking, and that in other countries, particularly in some provinces of India proper (in quibusdam Indiæ veteris provincus) it leaves a white substance similar to lime, which is called *tabaxir*. In the Indian Archipelago he distinctly says that this substance is not found in the joints of bamboos, and adds that in one place only (in Hituae aora) a similar substance was once brought to him by his servants.

Mason (Burmah, 1860, 503) merely says that some of the bamboos of Burmah secrete a silicious substance called tabasheer, which has a place among native medicinal substances; he adds the Burmese names, which means stone out of the bamboo.

In the new edition published by Mr. Theobald (1883) the latter states (Vol II, p. 102) that the fluid, which is contained in the joints of bamboos "is often limpid and a grateful drink when no other water is procurable in the forest, but as it dries up it becomes milky, and finally deposits a cake of gelatinous opaline silica at the bottom of the joint, known as *tabasheer*, possessing curious optical properties" He adds, these little discs of *tabasheer* may often be picked up in a bamboo forest, after the bamboo which yielded it has decayed; and when a bamboo forest has been destroyed by fire, these white calcined discs form quite a noticeable feature of the ground, especially when a shower of rain has removed the white pulverient ash.

The late Sulpiz Kurz in the excellent paper, which he communicated to the first volume of the *Indian Forester*, mentions the water in the bamboo joints, which often quenched his thirst during his tours in the Java hills, and he adds that "tabasheer is a siliceous, whitish floury substance, which is found as a secretion or more probably as a residuum in the interior of the joints of several species (especially *Bambusa arundinacea* often up to an inch in thickness." (page 239).

During my forest wanderings in India, particularly in Burmah, I have often seen the fluid contained in the joints of bamboos, and have drunk it. In those days, I endeavoured to ascertain more particularly the conditions under which sag is found in the cavities of the joints, but did not come to any definite result. I have seen the deposit of silica on the inside walls of the joints, but never in such large quantities as mentioned by Kurz, nor do I remember having seen the discs of tabasheer described by Mr. Theobald. But I must add that, during my Indian career I never found time for continued scientific research. The difficulties of first organization were too great, and the battle against those, who opposed forest conservancy, was too severe in those days to leave me any leisure for systematic study. The Foresters of the present day are in a much more favourable position, and hence I venture to hope that the present remarks may induce some of them, to study this subject on the spot in the forest.

So much is known for certain that tabasheer is found in Sylhet (probably also in Assam), in Chota Nagpore, in Burmah and in the peninsula, both on the east, as well as on the west side. Indeed I am disposed to think that it is formed in the joints of all large bamboos, at least in the Tropics. From what Rumphius says, one might doubt the formation of it in the extensive bamboo forests of the Indian Archipelago. But Kurz, when speaking of tabasheer in the passage quoted above, probably referred to his previous experience in the Archipelago, and I am disposed to think that Rumphius, though an excellent observer generally, may possibly, in the particular instance, have been mistaken. In a Dutch scientific periodical ("Tijdschrift voor naturlike geschiedenis en Physiologie." 1836, p. 13), I find the following notice in a letter from Dr. Korthals, written at Padang (Sumatra) in February 1835 "In the stems of several bamboos a considerable quantity of water is found. This water, which is mostly 4—6 degrees Centigrade below the mean temperature of the air, seems to contribute towards the formation of the gelatinous siliceous substance, which sometimes occurs in the bamboos and is precipitated out of that fluid.' It does not, however, follow from this passage, that tabasheer was found by Dr. Korthals in Sumatra.

These are the main data, which I have been able to gather upon this subject. Before explaining my suggestions regarding the researches which I venture to hope will be undertake in the bamboo forests of India and Burmah, it may be be useful briefly to sketch the ideas which I have formed at present regarding the formation of tabasheer in the living bamboo stem.

When the young bamboo shoots first make their appearance, they consist of a continuous mass of soft fleshy tissue. Only gradually, as the internodes lengthen out and the joints become visible, hollows are formed in the joints. At that time the shoots have no side branches, they generally bear only a few leaves of the ordinary kind at the end of the stems, and in this state the substance of the joints is soft. This is the stage at which the wood fibres can readily be separated and made into paper stuff.

* The extracts here given are taken from the translation as I had not the original here to refer to.

Towards the end of the first rainy season, however, the development of lateral branches commences, and at the same time the joints become hard by lignification and by the deposit of silica in the cells and fibres near the outer surface of the stem. After this process of induration has progressed to a certain point, the separation of the wood fibres become difficult, and at that more advanced stage the bamboo stems can no longer be used for the manufacture of paper stuff.

The silica which is used in the process of induration, is taken up from the soil by the roots, and the sap which fills the vessels, fibres and cells of young bamboo stems, must therefore, at the time, and the process of induration has commenced, hold silica in solution, possibly in combination with other substances. Evaporation goes on at a great rate through the leaves, the sheaths and the surface of the internodes, while under the influence of the light, the carbonic acid taken up from the air, together with the water, nitrogen and mineral salts taken up by the roots, are transformed into the substances forming the tissue of the growing stem. The silica gradually accumulates, and the result of this accumulation is the induration of the outer portion of the stem. The process is analogous to the accumulation of lime in old leaves to which I drew attention in the *Indian Forester* of February 1886 (p. 58), with this difference that the leaves of *Pinus Laricio* to which my remarks at that time related, taken three years to increase the proportion of lime in their ash from 15 to 70 per cent whereas in the bamboo stems the accumulation of silica is accomplished in a few months.

Some of the sap, with which the cells of the tissue are filled, collects in the cavities of the joints, and as already stated, the tabasheer is produced from this fluid, though the manner in which it is formed is by no means clear. Tabasheer contains from 70 to 90 per cent of silica, and only from 10 to 30 per cent of other substances, including moisture. It is probable, that the living sap in the issue of the bamboo stem, *contains a much larger* proportion of other substances. Tabasheer cannot, therefore, be regarded simply as the residue of the substances held in solution by the sap. Again, it is not clear how the water of the sap is got rid of When insects have tappped the joints and have perforated the walls, the sap contained in the hollows evaporates rapidly, and such joints are always I believe dry. Some evaporation may, perhaps, take place through the walls of a joint in a sound condition, but I doubt whether that is sufficient to account for the formation of tabasheer. Apparently a process of secretion takes place, which has some analogy to the secretion of resinous substances and to the formation of crystals of calcium oxalate and other substances in the living tissue.

So much is certain that the subject requires further study, and that much study may lead to important results regarding the life history of the bamboo. The enquiry should bear, both upon the fluid in the joints and upon the tabasheer. In all cases it will be necessary to note the species of which any stems have been examined, the systematic as well as the vernacular name, and in case the former should not be known with certainty specimens for identification be collected, of the large sheaths upon the young shoots, of leaves, and whenever possible, of flowers Soil, elevations and other circumstances, which may have influenced the growth of the bamboo should also be noted.

As mentioned already, young shoots are solid, that is to say, they are entirely filled with soft tissue, and the hollow of the joint only forms gradually, as the stem grows older It will be interesting to study the formation of this cavity in different species and under different circumstances. At first I suppose the cavity is entirely filled with sap. Gradually the sap disappears in some joints, and endeavours should be made to determine which joints remain filled with sap, and for how long. It will be useful to measure the capacity of the joint, which can be done with sufficient accuracy by measuring length and diameter of the cavity, and the quantity of fluid contained in it should be determined by means of a graduated cylinder. The quantity of solid matter held in solution in the fluid should be ascertained by evaporation. As far as I remember, the fluid in the joints is tasteless, but a sharp saline and astringent taste has been ascribed to it by some authors. This uncertainty should be set at rest It should further be determined, whether the reaction is acid or alkaline, and whether in the joints of older stems the fluid gets gradually thicker and assumes the consistency of honey.

As regards the tabasheer itself, it would be important to ascertain, in which species it is found, and particularly whether it is really found in the smaller kinds also, such as *Dendrocalamus strictus*. Further, in which joints it occurs. The precise manner of its occurence, either in the substance of the tissue or as a lining of the cavity, or in loose pieces in the hollow joints, should be described in detail, and it would be well to ascertain further particulars regarding the discs of tabasheer mentioned by Mr. Theobald.

I do not know, whether tabasheer is still collected anywhere on a large scale in India. Should this be the case, it would be interesting to learn particulars regarding the method employed in collecting it, the quantities obtained per stem, its further preparation by calcination or otherwise, the price at which it is sold, and the quantity exported.

Professor Ferdinand Cohn at Breslau who is well known by his researches in different branches of anatomy and physiology of plants, is specially interested in tabasheer, and would be glad to receive communications on the subject It might also be useful to send him samples of the tabasheer collected and of the substances held in solution in the fluid and obtained by evaporation. I shall myself be glad, if desired to aid in these researches by ascertaining the correct systematic name of bamboos, of which specimens may be sent me, or otherwise.

In conclusion, I may add, that a complete list of the names of tabasheer in the different Indian languages will be found on page 65 of Moodeen Sheriff's *Supplement to the Pharmacopœia of India* Madras, 1869

Bonn, December 1886. D. BRANDIS.

NAUCHANDI HORSE AND AGRICULTURAL FAIR.

[FROM OUR OWN CORRESPONDENT.]

MEERUT, 28th March.

The Nauchandi Fair, which is the last, with the exception of Hurdwar, of the North-West Horse Shows, has just concluded, after a very successful exhibition of horses, cattle, manufactures and agricultural implements and produce. The Nauchandi Fair, a few years ago, was a mere collection of a few shops for the day, where a hundred or so of the poorer classes came and made their humble offerings at the nameless shrine which marks the site of what is now the biggest fair of its kind in the N. W. P. and Oudh. Batesar and Hurdwar have special characteristics of their own; but for district shows the Meerut Division is first in the Province, and in the Meerut Division Meerut itself holds the first place. The Government grant for prizes for horses mules &c., has been raised within the last five years from Rs. 350 to Rs. 1 500, and the Show is now open to all the districts of the division as well as Delhi and Gurgaon. The number of horses shown has risen in the same period from about 451 to 1,100, and would have been higher this year but for mortality and sickness amongst horses in the winter. The arrangements this year for the horses, and the judging were excellent, much pains having been taken by Mr, Wheeler, the Joint Magistrate in charge of this part of the Shows in making improvements to facilitate identification and selection. There was a very fine show of branded mares and fillies and the gelding class is increasing and improving every year. The complaint is still rife that breeders sell off their good produce and only keep inferior mares for the Government stallions, so that any hope of improving the stock is out of the question. This idea, however does not appear corroborated by the Meerut Show, where the brood mares shown were of very high quality. The Remount Agent and the Bengal Cavalry Committee both attended the Show and made purchases, but dealers were inclined to hold up till Hurdwar, where, no doubt, many cheap bargains will be secured. The number of mules brought in for sale is increasing yearly, but the prices asked for really serviceable animals are extravagant and prohibitive.

The Fair itself consists of two cross streets, with about six or seven hundred shops: articles for exhibition are collected in enclosures in charge of their several committees. The show of carpets, pottery durries, country cloths, brass goods from Muttra, carved and painted wood-work from Shahjehanpur (sent by the enterprising Judge Mr. Mulock) leather work, cutlery, &c., was unusually large; but the makers have taken to asking such exorbitant prices that purchasers are "choked off" In the agricultural department a considerable advance was noticeable on the Shows of previous years: more samples of grain were sent in, and they were the genuine produce of cultivators. The Department of Agriculture and Commerce exhibited several machine pumps, chaff cutters, dredgers, boring tools sugar boilers and refiners, and under the able superintendence of Mir Mahomed Hossein, the Assistant Director, this part of the exhibition was more popular and instructive, Thousands upon thousands thronged daily to see the machines, and even to handle and give their opinion on the exhibits of produce: the Committee, indeed, which awarded the prizes under this head are said to have called in the aid of intelligent cultivators in adjudging the award—an excellent idea

The principal feature of the agricultural side of the Show was Mr. Rogers' new sugar mill. An endeavour had been made by the Collector, Mr. Wright, to arrange a competition between Mr. Rogers' mill and the well known Beheea mill; but Mr Thompson, the proprietor of the latter, is understood to have declined, on the ground that the two mills could not compete on the same conditions, his having stood the practical test of rough usage in the fields for the last ten years, whilst Mr. Rodgers' was too delicate a piece of goods for the same work. Anyhow, Mr. Rogers' mill was greatly admired in the Meerut Show, and orders given for it in considerable numbers; and it promises to supersede in time the now somewhat old fashioned and cumbersome Beheea mill, Mr. Rogers' mill is a perfect little bit of mechanism, and packs into a very small compass; but this is not the place to describe it in detail. Mr. Rogers also exhibited samples of his compressed fodder, and a Committee "sat upon" it presided over by Major-General Sir George Greaves, K.C B, commanding at Meerut. The result of the Committee's deliberations has not been made public.

There were two days' good racing, a novel feature being a few open races in which the sporting 8th Hussars were prominent performers. The jumping competition was won by Major Clowes on a beautiful jumper, once his own horse. Major Clowes is the Master of the Meerut Hunt, and his approaching departure for England is a subject of universal regret, for, as a good sportsman and good "fellow" all round, he is most popular in Meerut. On the last day of the Show the prizes were distributed in the afternoon by Mr. Lane, the Commissioner, and Mr. Wright, the Magistrate, to whose exertions the development of the Fair in the last five years is due Mr. Lane read an address in which he dwelt upon the vast benefit which these agricultural fairs and horse shows conferred on the artizans and agriculturists of India. The Nauchandi Fair had made great strides, an artizans from even distant stations now sent specimens of their work to it. Short of a general scheme of technical education, which they could not hope to see carried out yet, there was nothing better calculated to raise the quality of workmanship than the competition between exhibitors at these fairs Mr Wright went on to say:—

"As a horse Show we have succeeded in throwing it open to the Meerut Division, and in this connection I cannot too warmly thank Mr Hallen, the General Superintendent of Horse-Breeding Operations, for the generous support he has given our efforts to raise the status of this show, Instead of the Rs. 35 which was the Government grant in 1883, we have now a prize list of Rs 1,500 to which

the local Committee add Rs. 500 for the successful horses of the Meerut District I do not think any one can complain of this restriction : the mony is raised in the district, and may fairly be expected to flow back into it The number of horses shown at the fair in 1883 was 487. It reaches this year the aggregate total of nearly 1,100 ; it would have probably been much higher but for the sickness and mortality which prevailed amongst horses during the last cold weather. In the improvement of cattle we see a distinct advance, highly bred bulls are being purchased, and the effect on agricultural stock will be beyond doubt very clearly traceable in a year or two, I have not yet succeeded in making this Show a cattle fair, but I continue to do all that is possible with that object, I am sincerely gratified to find that as regards manufactures, the past five years have seen the most remarkable progress in carpets, durries, curtains, prottery, muslins, common cloths, blankets, wood-carving, leather work, &c. I who have watched these fairs now for many years past, can see the most remarkable improvement, due, I am convinced, solely to competition and the judicious award of prizes. The idea of giving a prize for any out-the-way bit of work, however useless, is exploded, and we give our prizes to the best of the class in fair competition, helping wheneve we can, the evident germs of inventive talent to develop and grow into success. It is unfortunately a necessary result of this publicity and consequent demand that prices must rise ; but I do not think we can, from the point of view of Government officials, take exception to that. Under the head of agricultural implements and produce, I have this year to notice the exhibition of Mr. Rogers' new sugar mill I endeavoured to arrange an open competition between Messrs. Thompson and Mylne, the inventors of the well-known and universally used Behea mill ; but that firm declined on grounds as to which it is unnecessary for me to say much here I feel bound to say, however, that Mr Rogers' mill appears to have excited the very strongest interest amongst the agricultural classes, and particularly those clever cultivators, the Jats of our richest tahsil, Baghbut ; and there can be no doubt that, if satisfactory arrangements are made to prevent the risk of any loss to the ryot from breakage, &c., Mr Rogers' mill, which is mechanically the most perfect machine we have seen in this part of the world, has a great future before it. It is of scarcely less interest to notice that a native has invented and patented a mill which, as a specimen of native workmanship, and adoption of sound mechanical principles, affords the gratifying spectacle of inventive talent aroused in this direction also amongst our humbler artizans. The interest in the show was enhanced by the exhibition of improved agricultural machinery and implements by the Agricultural Department These attracted the closest attention from the crowds of onlookers, and I was informed by the Assistant Director, Agriculture and Commerce that many orders were received by him for pumps and other machines on the spot.. I am able to notice with satisfaction that the exhibition of agricultural produce this year began to show some reality. The example set by the experimental farm near Meerut has evidently aroused an interest in the subject, and the exhibition of grain (especially wheat), cotton, hemp and sugars was particularly good. It is gratifying to learn that the prizes were earned by genuine cultivators, who thus have practical proof of the advantage of growing good produce, by the selection of good seed, by the adoption of new staples, and by careful cultivation. Our ryots have not apparently much to learn under the latter head, but that they have something to learn in other ways is evidently admitted by themselves in the interest they show in this department of the exhibition."

Mr Wright concluded by thanking the local staff, Committees, &c, who had assisted in making the Fair a success, The reports of the several Committees were then read, and at the close Mr. Lare addressed those assembled in a happily-worded speech, pointing out the advantages of such fairs and the necessity for keeping good stock if the breeders wished to have good produce. A display of fireworks and a supper to the residents of Meerut, given by Hafiz Sheikh Abdul Karim, Khan Bahadur, closed a busy but amusing and instructive week. —*Pioneer*

MR. SMEATON ON THE INDIAN WHEAT TRADE

BEFORE leaving these Provinces for his new post in Burmah, Mr. Donald Smeaton, the Director of Agriculture, has written a Memorandum upon the Indian wheat trade which deserves the careful attention, not only of Chambers of Commerce, merchants, traders and cultivators, but of every one interested in the prosperity of our Indian Empire. So far as it deals with the present condition of the trade, the Memorandum is mainly valuable for the clear light it throws on the tricky methods of cultivators, dealers and exporters, and the demoralisation consequent thereto ; but it also gives some important original suggestions for diminishing the cost of laying down wheat in the London market, and sketches the lines on which the Director's experience has led him to believe the operations of the Agricultural Department can best proceed

On the first point the evidence is clear to demonstration and reveals a degree of sophistication nothing less than startling. The Director thinks that, considering the methods of cultivation at present in vogue, refraction for adulteration and dirt cannot as yet be entirely abolished ; but he is certain that it need never be more than two per cent. It is at present from five to six per cent, the consequence being that no wheat goes from these Provinces without an admixture of from three to six per cent of peas, straw, chaff or dirt. The shipper in Calcutta or Bombay tries to make profit out of this system by charging excess refraction. Occasionally he succeeds but for the most part the cultivator or the up-country dealer has now come to see that under the present system trickery means success. Knowing that if he sent 100 maunds of pure wheat to the port he would not get a pice more than if he were to send 94 maunds of pure wheat and six of dirt, he takes care that the dirt shall be there. More than this, he in his turn tries to overreach the merchant, and there are actually men kept in Calcutta whose sole business it is to bribe the shippers' employes to pass consignments at a low refraction. To use a metaphor from commerce, the honest cultivator and dealer are at a discount, the most ingenious rogues at a premium. One instance we cannot refrain from noticing. In June 1886 some wheat belonging to the Muzaffarnagar agent of a well-known European firm was seized and sent to the medical officer for inspection, when it was declared to be *unfit for human food.* Under examination the agent stated that he had been unable to supply wheat to his firm unless he mixed old wheat with new, and correspondence produced in Court showed that the Bombay firm had examined and approved samples of the mixture. The old wheat thus employed for purposes of adulteration was bought at 33 seers for the rupee, while good wheat was selling 16 to 18 seers the rupee. When disgraceful cases like this are connived at by European firms of repute how can the native dealer be expected to be either upright in his transactions or careful in his cultivation? Or how can Indain wheat ever be expected to compete with American in the London Market?

Obviously, so far as considerations of the morality of trade are concerned, there is nothing to forbid the conclusion that the primary blame for the demoralisation that at present discredits the wheat trade rests with the merchant-exporters, but did we know nothing of cases like that at Muzaffarnagar, the conclusion would yet stand, for had the exporters not set up a five per cent. refraction against knowledge, the waste of dirt and adulteration would never have swelled up to its present height. No doubt when the Calcutta Wheat and Seeds Association tried above two years ago to reduce the refraction from six to five per cent. during a certain portion of the year, the up-country dealers boycotted them and they were unable to carry their point ; and this does not show that the fault of the present system lies with the cultivators, or even with the middlemen. On the contrary, as Mr. Smeaton suggests, the action of the dealers was in all probability prompted by a previous painful experience of the attempts made at Calcutta to extort excess refraction, and a knowledge that this abuse might become more intolerable with a low than with a *high* refraction. While however the evil originated with the shippers it seems now to have passed beyond their power to cure it. The up-country dealers distrust the Calcutta merchants, and refuse to believe in their anxiety to get wheat as clean as possible and to pay for it. All they believe is that they are trying to get cleaner wheat without paying more. Mr Smeaton, therefore comes to the conclusion that an independent authority established at the ports, say a committee of mercantile men aided by an expert appointed by Government, will alone be accepted by up-country dealers to determine all questions relating to refraction and classification Mr. Smeaton, however, would not allow this independent authority to fix the standard of refraction, that is, the degree of purity which may ordinarily be expected in Indian wheat provided no sophistication took place, but thinks this can only be done by a representative of the London importers. Here we confess it is not quite easy to follow the Director. It may be true that London merchants are in ignorance of the capabilities of Indian cultivators, that they think five per cent, of dirt inseparable from Indian wheat, and that so long as they refuse to believe anything else and pay for anything else, the Indian shippers could not adopt a lower refraction ; but it is hard to believe that London merchants, if they received the pure samples and *bona fide* assurances of the Chambers of Commerce in India, would be so extremely hard to convince. Why should they hesitate to try some consignments bought on the supposition that they are two instead of five per cent. below purity when they can easily stipulate for rejection if it is not so? The real difficulty is to get out of the heads of dealers and cultivators the suspicion that shippers are constantly trying to overreach them. If an independent authority, of whose good faith the cultivators were assured, were established to examine the wheat at the ports, and the merchants of Calcutta Bombay and Karachi were simultaneously to insist on having wheat without more than two per cent of dirt and adulteration, it is impossible to conceive that the cultivators would long hold out.

Meanwhile Mr. Smeaton suggests certain methods for cleaning the wheat and cheapening the cost of its transport after it has left the cultivator's hands One of the chief of these is the substitution of the American method of carriage in bulk for carriage in sacks, which latter is universally in vogue in India. He calculates that the saving that would thereby result on the cost of bags, of bagging, of marking and sewing, and of freight, would amount to one rupee in carrying one quarter of 496lbs. from Cawnpore to Calcutta There is also the additional advantage that the actual carrying capacity of the railways would be greatly increased The difficulty in the way of adopting this method are comparatively trivial. Existing waggons could be easily adapted for the carriage of loose grains, and the agents who

purchase the grain could have it brought direct to shelter sheds erected at the railway stations instead of being first taken to a local market. If the grain were also shipped in bulk, a further saving of 75d. would be effected and a quarter of wheat grown in the North West Provinces could be deposited in London for 30s. 3·18d, instead of 31s. 10·93d. Mr. Smeaton further describes an ingenious contrivance by which the wheat could be cleaned down two per cent. of foreign matter at the terminal station, the main idea being to discharge it through a sieve (the construction of which is described), by which process this matter is got rid off. If this system were adopted all exported wheat would be reduced to a minimum uniform rate of refraction and the wheat would appear in a highly improved condition in the London market. The cost of these improvements would be small. The Benares railway bridge will it is estimated cost over 70 lakhs of rupees and it will when open to traffic, effect a saving of about 2 annas 10 pie per quarter on the carraige of local wheat to Calcutta whereas as we have said, one rupee a quarter would be saved merely on frieght and handling were Mr. Smeaton's proposals adopted.

Lastly, Mr. Smeaton makes some remarks on the help which District Officers can give in improving agriculture, which these officers would do well to lay to heart. He rightly enough believes that no efforts of officials can compensate for the loss of the motive of self-interest which the certainty of getting the best price for the best and cleanest wheat would awake; but still, by promoting shows and distributing seed, the Aricultural Department can do much if seconded by District Officers. It is disappointing to hear that some officers in these Provinces have utterly declined to co-operate, but it is to be hoped their number is small. The officer who now-a-days refuses to move because he believes the Hindu cultivator to be a fosill, gives the best proof imaginable that he himself is one. The supposed fosill has already shown signs of vitality, and the indications will become more frequent and striking in proportion as we can show him it is his interest to discard apathy, sluggishness and roguery, for activity, enterprise, and straight-forward dealing.—*Pioneer.*

SOME SKIN ERUPTIONS.

A HEALTHY skin is one of the pre-requisites of perfect health. Next to regular features, nothing is more essential to beauty. In the skin, more than elsewhere, lies that beauty which is the charm in the bloom of youth. Anyone may be able to designate the functions of many of the various organs—as that the use of the eye is to see, of the brain to think, of the stomach to digest food, and so forth. But it would puzzle many to set forth the functions of the skin. A fifth of all the water taken into the system passes out by the skin, principally in imperceptible perspiration. This water carries with it the products of used up tissues. Not only this, the skin possesses a feeble power of carrying on respiration. Now, we will state that of the integument there is between thirty and forty square feet of surface dotted with myriads of little canals, and ask, what else can be expected where this tissue is neglected than that poor health should follow? If these minute ducts become obstructed, impure products are not so easily excreted. The fat-glands and the sweate glands may become diseased also by inattention to the health of the skin. That was indeed a strange case that occurred a little while back, where a woman, on being invited to the bath, as was usual in the almshouse, informed those in command that she hadn't had such a thing for nine years, and didn't propose to begin the habit now.

Bathing is, unquestionably, one of the most salutary and desirable of all hygienic measures for the skin. Gentle friction, and ablutions are, to a certain extent, absolutely indispensable to the perfect health of the integument. The ancients seem in many ways to have paid more attention to the skin than is the general custom now. How often do we read of their washing one another's feet, and of anointing. These customs have passed away, but they had a valid foundation in sound reason. They may not come in again, but it would be better if they did.

The discovery, by Professor Liebreich, of a new fat, Lanoline, which is natural to the skin and hair, has given a fresh impetus to the care and treatment of the skin in medical quarters.

Ordinary soaps, as is well known, often cause pimples, blotches, and sores on the face, and prevent eruptions already formed from healing. They remove the fat and dry the skin, so that it becomes hard, inelastic, and rough, and loses its natural colour. Now Lanoline, being the fat natural to the skin and absorbed by it at once, is pronounced by dermatologists to be the best possible preservative of this tissue, restoring its soft, pliable, and elastic nature and healthful gloss. There is now prepared what is called a Lanoline Toilet Soap. It is made with Lanoline and by centrifugation. The process of centrifugation is quite new in the manufacture of soap; it affords a superior product, and precludes adulteration of various kinds.

Lanoline is now employed in most of the ointments prescribed for skin diseases, and is said to have a restorative power upon unhealthy skin.

The Cream is emollient, protective, and healing. It supplies the skin with the fat natural to it, and is highly praised for abrasions, mucous patches, herpes, chapped hands, roughness, hardness, &c.

There is also made a Eucalyptine Lanoline Soap. The cleansing, purifying, restorative influence of Eucalyptine upon the skin, especially in cases of pimples, chapped hands, abrasions, freckles, and other discolorations has often been adduced, and the usefulness of the soap in rheumatic and neuralgiac states, as well as in acne, has been suggested.

Thousands of cases of skin disease have been treated with this new discovery with exceptionally brilliant results.—*The Doctor.*

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Health, Crop and Weather Report

[For the Week ending 7th April, 1887.]

Madras.—General prospects fair.

Bombay.—Week rainless. Reaping of *rabi* crops still progressing in some districts. Standing crops injured by insects in parts of Karachi, and by frost in parts of Hyderabad, Fever in parts of eight, cattle-disease in parts of ten, and small pox in parts of five districts

Bengal —Rain with high winds over the whole Province. Rain very heavy in Central and South-Western Bengal. Ploughing well forward, and sowings of early rice, jute and indigo are proceeding. *Boro* rice being reaped in places. *Rabi* harvest generally gives a good out turn. Opium nearly all gathered in. Mahwua has begun to fall. General health continues fair.

N.-W. Provinces and Oudh.—*Rabi* harvesting continues. Prospects good, and markets well supplied Slight rain and hail in a few districts. With the exception of cholera and small-pox in some places ; the public health is good.

Punjab.—No rain fell last week, and crop prospects are generally unfavourable throughout the Province. Health good. Prices falling in the Mooltan and Shahpore districts, elsewhere high and stationary.

Central Provinces.—The weather has been stormy and unsettled, and showers of rain have fallen in places. Prospects continue unchanged.

Assam.—Weather seasonable. Sowing of *ahu* paddy and *dumahi* crops in progress. Pressing of sugarcane nearly over Land being cleared for sugarcane, *Ahu* seedlings thriving. Prospects good. Cholera in Cachar, otherwise public health good. No cattle-disease reported.

Mysore and Coorg.—Slight rain in parts, Standing crops generally in good condition, except in parts of Tumkur. Harvesting almost finished, in the Mysore district. Prospects of season favourable Public health good. Small-pox and cattle-disease continue in affected parts. Prices slightly risen in Kolar and Tumkar districts, and fallen in Kadur and Hassan districts. Good showers have fallen in West and South Coorg, which have been beneficial to the coffee blossoms.

Berar and Hyderabad.—Weather warm. *Rabi* threshing continues in Amraoti, nearly finished in Akola. Fever in one taluk, otherwise public health and health of cattle good, Fever, Small-pox and cattle disease in places, and cholera has broken out in the city of Hyderabad. Prices steady.

Central India States.—Weather cloudy and hot. Some rain has fallen in places. Cholera diminishing nearly everywhere. Prospects of crops fair, opium being gathered. Cholera diminishing everywhere. Prices steady.

Rajpootana.—Weather seasonable and cloudy ; but with the exception of a few drops in two places, week rainless. Tanks and wells generally diminishing. Crops being harvested with fair outturn. Small pox prevalent in Marwar, Jhallawar, Ajmere and Kerowlee, otherwise public health good. Prices fluctuating.

Nepal.—Weather seasonable. Prospects fair.

Letters to the Editor.

TABASHEER.

TO THE EDITOR.

Sir,—I have read with much interest the article from the *Indian Forester* on "Tabasheer," reproduced by you in your issue of the 9th instant. The writer expresses his own, and cites other opinions on the formation of Tabasheer. Writing of its chemical composition, Dr. Brandis, in the course of his paper, says:" Tabasheer has been repeatedly analysed. In one point all analysers agree, that it chiefly consists of silica, the proportion varying between 70 and 90-per cent, with a small quantity of moisture and organic matter. The other principal substances are lime and potash, but their proportions seem to vary And to establish it, the writer refers to "Turner's Analysis of Tabasheer." Permit me to say that the composition of Tabasheer is :—Silex 70, Potash and Lime 30 (Vauquelin). Now. Sir, who is correct? Regarding the formation of Tabasheer in the bamboo, the writer says :—" The silica, lime, and potash were doubtless originally held in solution in the sap, which is taken up by the roots from the ground. The sap which fills the cells of the growing bamboo-shoots holds those inorganic substances in solution, together with sugar, gum, and other organic substances, which have been elaborated by the action of the leaves. As the shoot grows older, cavities are formed in the joints, and in these cavities some of the sap collects, from the surrounding tissues. The existence of this watery fluid in the hollow joints of the bamboo is well known to all who have spent some time in the bamboo forests of India and other tropical countries."

Dr. Brandis asserts that there is little doubt that *tabasheer* is the residue of this fluid, but it is not clear how it is formed. In this connection, I would beg to say that silica is extremely abundant in some plants, and comparatively rare in others, they no doubt obtain it from the soluble silicates, especially that of potash, which are fond everywhere in the soil. In the bamboo it forms the hard varnish that guards the whole surface, and is occasionally excreted in its hollow stems in the form of the opaline substance, and *this* substance is tabasheer. Again the learned Doctor says: " Sir David Brewster expresses a remarkable view regarding the formation of *tabasheer*. He thinks that it must be the result of a disease in the *bamboo* of a disorganized state in the transverse walls which separate the joints. He adverts to the statement made by an intelligent native of Vizagapatam, that the walls of these joints which contained *tabashcer* are always perforated by holes made by an insect, but adds correctly that *tabasheer* is often found in joints which have no such holes." Now if the above statement is to be relied upon, why are not such diseases common to other species of bamboos ?

The writer further says that the conclusion to which he (Sir D. Brewster) had arrived "seems to be that the sap is collected in the tranverse wall which separates the joints, and that when the tissue of the wall gets diseased. or when the membrane which clotches the inside of the joints is injured, the sap which holds the silica in solution filters through into the joints, and on drying up leaves the *Tabasheer*,"

I need not encroach further upon your valuable space with quotations, but beg leave to say that tabasheer is nothing more nor less than a *conglomerate* form of raphides. If these raphides be heated red hot, it will be observed that they at first become black and again white, as the heating is continued to redness ; in this state they readily dissolve in weak nitric or hydrochloric acid, with effervescence ; if to this solution oxalate of ammonia be added, a copious white precipitate is obtained, which indicates that the base in this case has been lime And hence it is evident that its composition is oxalate of lime.

HEM CHUNDRA DUTTA.

Calcutta, April 12, 1887.

NOTE.—We are not sufficiently read on this subject, and so cannot offer an opinion ; but we fail to see how our correspondent connects "raphides of the conglomerate form" with tabasheer. In what respect is this "conglomerate form of Raphides" identical with the substance found in Bamboos ? Probably the base of the Raphides is oxalate of lime; but has the same test been applied to tabasheer, and was the result oxalate of lime ? The question we are at present concerned with appears to us to be : How is the tabasheer formed ? So far we have not advanced beyond surmises, and even Dr. Brandis only deals in generalities. We shall be very much obliged to our correspondent if he can throw more light on the subject.—ED., *I. A.*

Editorial Notes.

WE are very glad to learn that Mr. Charles Maries, of the Durbhunga Raj, has been made a F. L. S. (Fellow of the Linnœan Society), the highest honor that can be conferred upon a botanist, and the one which he values most from a botanical point of view. Mr. Maries has contributed largely to botanical science, and the distinction is well deserved : we congratulate him, and hope he will long live to enjoy and merit the honor.

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FROM the printed proceedings of the Agri-Horticultural Society of India, for March last, we gather that several letters on the subject of *Sabé* or Bhabui grass have been received since the last meeting; among others, one from Sayud Ali Nawab, giving very full particulars of the quantities imported from Nepal, *via* Joinuggur and Durbhunga districts, together with the price, months during which imported, &c. The samples of grass received from the different districts were sent to Dr. King, who identified them all as *Sabé*, or *Bhabui*, now known botanically as *Pollonia Eriopoda* (Hance,) synonymous with *Andropogon involutus*, (Steudel) *Spo diopogon angustifolius* (Trim) and *Slaniger* (Ness.)

A LOCAL CONTEMPORARY understands that the Cirencester Scholarships, established by the Government of Bengal under Sir Ashley Eden, are to be discontinued temporarily. These scholarships, since they were founded in 188?, have been awarded, two in each year, to distinguished Native graduates of the Calcutta University, to undergo a training in agriculture at the Royal Agricultural College at Cirencester. Several of the earlier scholars have finished their course at the College, and have since returned to this country, and there are about five or six of them in the Government service now who are doing good work. The reason for the temporary discontinuance of these scholarships is not given.

WE may, at no distant date, expect to have Fijian tea competing with the Indian product. Mr. Barrat (of the firm of Mackinnon and Barrat, Masusa plantation, Wainunu,) an old Indian tea planter, who has been engaged in the cultivation of the fragrant leaf for the past three years in the Fiji islands, has written a long article in the *Fiji Times*, stating that the plant gives a return of 25-per-cent better than any which had come under his notice during his Indian experience ; and recommends tea planting in Fiji as a suitable industry for people of moderate means. This opens out a new field for the congested state of the industry in this country ; and as the islands are so well suited for tea, some of our many planters may do worse than 'prospect' Fiji.

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THE Kew authorities have taken a wise step in bringing to the notice of the Indian Government that a very considerable portion of the Continent of India is not subjected to botanical investigation, and suggesting that steps should be taken to remedy this. The first step in this direction is that the Superintendent of the Botanical Gardens at Saharanpore will, from the 1st of this month, be attached to the Imperial Department of Revenue and Agriculture, the gardens themselves remaining under the Provincial Government. Mr. Duthie, who is a distinguished botanist, and now in charge of the gardens, will, as before, have his head-quarters at Saharanpore, but will extend his botanical researches into all provinces and territories in the north of India, which are not at present equipped with a botanical establishment.

SOMETIME about the end of last year the Rev. Dr. Carey brought with him some very fine specimens of what are called "white-elephant" potatoes from England, and presented them the Agri-Horticultural Society of India for trial in this country. Six of these tubers were sent to Mr. Charles Maries, of Durbhunga, in December last, for trial. Mr. Maries now writes to the Society that these have yielded 21lbs. of tubers, from as many sets, and observes that they would have given a splendid crop if planted about two months earlier It is not stated what Mr. Maries' crop is like ; but doubtless the society, who have accepted Mr. Maries' offer of some of the tubers, will, in due course, give us the benefit of their opinion thereon.

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THE returns of the rail-borne trade of the Central Provinces for the last quarter of 1886 show a decrease of nearly six lakhs of maunds, as compared with that of the corresponding period in 1885, which is entirely confined to the exports. The falling off is ascribed to the peculiar character of the monsoon rainfall, which proved disastrous to rice and linseed, the latter crop having proved a total failure over a large portion of the provinces. The export of rice fell from 2,74,103 maunds in 1885 to 87,966 maunds last year ; linseed from 3,81,884 to 1,75,435 maunds ; wheat from 16,52,248 to 13,81,030 maunds, and gram from 255,851 to 1,02,572 maunds during the same period. The season was favourable enough for wheat, and the falling off is due to a rise in price consequent upon the partial failure of the rice crop. The export of cotton, however, shows a considerable increase, having risen from 41,887 maunds, in 1885 to 77,852 maunds last year. The imports into the provinces, on the other hand increased by nearly two lakhs of maunds, but were mainly confined to salt and metals from Bombay, and *juar* and *bajra* from the Berars.

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FROM the Report on the river-bourne trade of Assam, for the quarter ending the 31st December 1886, which is the seventh of the series published, we gather that the weight of the principal commodities exported by boat and steamer to the Bengal blocks amounted to 474,619 maunds, and the imports to 686,702 maunds, as against 637,667, and 527,818 maunds, respectively, during the corresponding quarter of the previous year. The decline in the weight of exports is mainly ascribed to a falling off in the export of rice, in the shape of paddy from the Surma Valley, owing to the unusual floods of 1886 in Sylhet. Oil-seeds, mostly mustard, were also exported in smaller quantities ; but the exports of coal and tea largely increased. The increase in the imports is mostly due to larger quantities of rice having been imported into the Surma Valley, the natural consequence of the decline in the export of paddy. There were also small increases in salt, sugar (undrained), iron, and other metals, counterblanced by decreases in gram, coal, cotton goods, and a few other articles. Eastern Bengal, Calcutta, and Chittagong imported more than in the corresponding quarter of the previous year.

THE exports from the Punjab for the last quarter of 1886, show a falling off of 6,000,000 maunds, as compared with the exports of the same three months in 1885 :

Oct. to Decr.		
1885	...	... 7,574,107 Maunds
1886	...	... 1,578,561 ,,

The greater part of the fall was in wheat, the exports of which from Kurrachee, during the same period, compare as follows :

1885	...	... 4,065,392 Maunds.
1886	.	... 143,256 ,,

As 27 maunds go to the ton, the total export was but little over 5,000 tons during the three months. We have remarked upon these wheat exports before, that it is impossible to say much about their economic value until we have seen their effect tested by a succession of unfavourable seasons. We have little doubt that Mr. O'Connor has his attention directed to the subject, and wait with interest for the annual review of the wheat trade of India due a few weeks hence.

WE note that the Agricultural Department of Madras has been turning its attention to the establishment of a silk industry in that presidency. The intention is to open Government Cocoon farms under the sole charge of the Forest Department, in selected places on the borders of Government forests, where cocoons could be reared with ease. The "Mylitta silk mills," owned by Messrs. Deschamps and de Gaingue, Madras, which are now in full working order, have, we understand, undertaken to purchase at a fair price all the cocoons produced at these farms. Cocoon farms similar to these, and owned by ryots are, it seems, numerous in the Central Provinces, where they yield profitable returns. Let us hope that, after the Government of Madras has fairly started the industry, it will withdraw from all share in its profitable pursuit, except for experimental purposes, so that at no distant date these private cocoon farms might become as numerous and profitable in the Madras Presidency as they are said to be in the Central Provinces.

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WRITING of Mr. Arthur Roger's process of compressing fodder, and the coincidence that a member of the Greenwich firm of Goode Brothers should have arrived about the same time with a view of submitting to the Indian Government another invention of a similar nature, the *Pioneer* says: "A few days ago a meeting of transport officers and others interested in the subject was held at Saharunpore, and samples of fodder compressed according to the rival methods were exhibited. A special committee was then formed to examine more particularly into the merits of the rival systems, and the members of it have, we understand, presented a report of their conclusions to the military department. It is impossible to foreshadow what will be arrived at. Goode's fodder has already been received with favour at the War Office; but, setting aside the question of the comparative merits of the fodder produced under the two systems, on which we cannot at present speak, Mr. Rogers' method has the advantage that it admits of cheap and easy application in this country. As we have already pointed out, Mr. Rogers requires no plant or machinery not already in existence, and as the cotton presses lie idle eight months of the year, they could be hired at almost nominal cost. At all events the security of supply, and the immense saving in transport charges, which the use of compressed fodder would render possible, make it almost certain that Government will come to terms with one or other of the competitors, if, indeed, an arrangement be not made with both."

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THE following note from *Indian Engineering*, regarding irrigation on lands impregnated with alkaline salts, is interesting, and worth remembering, especially when dealing with the evil of salt efflorescence:—"Mr. William Willcocks—so well-known in the Academic history of Roorkee—in a recent paper on 'Irrigation in Lower Egypt,' read before the Institution of Civil Engineers in London, made reference to the evils of 'Salt-efflorescence,' from excessive flooding from the Nile. He particularises a belt of land formerly very fertile, now barren, owing to salt efflorescence and lack of drainage. The same troubles that are so well-known in India are threatening irrigation in the southern part of the State of California where the *Reh* plague of India has already made its appearance. It is thus accounted for by an American Scientist:—Continuous irrigation has raised the water table, so that only from half to one-third the quantity of water is now needed: but there is danger of a superabundance of water forcing roots near the surface, while the alkali will also be brought near the surface and cause various evils to health, and would ultimately render the land unfit for cultivation unless relieved of the accumulation of alkali. The remedy is under drainage."

THE following is a summary of Messrs. Wm. Jas. and Hy. Thompson's Fortnightly Circular of Indian Tea, dated London, 17th March, 1887:—Since the 3rd instant, about 36,000 packages have been brought to auction, 30,500 of these being of fresh import, 1,300 reprints, and 4,200 from Ceylon. The position has somewhat improved during the fortnight, the evidence afforded by the smaller sales, that the pressure is over, having given more confidence to the trade. There is also rather more business doing in the country, which, with good daily deliveries, has encouraged buyers to operate, the result being a steadier market for common teas—which still form the bulk of the supplies—and a hardening in the value of all good qualities. Competition has again been strongest for the b[illegible] description of Pekoe Souchong, Pekoe, and Broken Pekoe and the present currencies for these are now so much above the prices for good, useful liquoring teas, of medium grade still selling between 8*d.* and 10*d.* per lb, that the attention of buyers should be directed to the latter, owing to their relative cheapness. Shipments from Calcutta to date, advised by cable, amount to 75 million lbs., of which 70 millions have been received, and 61½ millions sold. The lower rates for Ceylon tea quoted in our last circular, have led to a freer business, and there is now more enquiry and a stronger market.

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MANY of our time-honoured customs and usages are receiving rude shocks at the hands of the modern irrepressible—in other words—investigator. It appears that we are entirely wrong as to the advantages of shoeing our horses and other beasts of burden. A writer in the *Farmer* has been discussing this question at some length. It appears that he has a number of horses on his farm, which he used formerly to have shod, but, for the past two years, he has left them unshod, and the benefit is manifested in their increase of hard work and greater endurance. Constant usage, it is stated, does not wear the hoof, as some might suppose. There is an adhesiveness in the foot of the horse, so that when it strikes the ground the hoof is not ground off, as it would be, did it not carry away a part of the earth it treads upon. On the other hand, the iron shoe is the fundamentla cause of a large percentage of the diseases of the horse's foot and leg. The contracted hoof or the "pinched foot," the ring-bone, the spavin, the wind gall, the corn, the distorted tendon, &c., are among the most common ailments that arise largely from shoeing. When we take into account the Arabs and various predatory tribes to be found in different parts of the East, who never think of shoeing their horses, and also the endurance and long life of such horses, one is inclined to put some faith in the argument that it would be better if horses were not subjected to the unnatural custom of being shod.

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THIS indefatigable enquirer has calculated that the English custom of horse-shoeing costs England every year on an average nearly nine millions sterling in hard cash, every penny of which might be saved if horses were allowed to go unshod. The facts and figures on which this extraordinary conclusion is based are thus stated by one who has been at great pains to search early history. Quoting an imposing array of authorities from Xenophon, whose unshod cavalry "marched from Cunaxa over the Armenian highlands to the walls of Trebizond," down to the "Free Lances" of the present day, the authority contends that it is safer, cheaper, and in every way better to let horses go unshod over the hardest roads—especially over the slippery asphalte of London streets. Two millions-and-a-quarter per annum would then be saved in farriers bills alone; but this is only a fractional part of the money which would be saved by the trebling of the duration of equine existence. Horses, which are now used up when twelve years of age, would, he contends, last fourteen years longer if they were not shod; and the value of this prolongation of the working life of a horse he estimates at one-hundred-and-thirty-five million pounds in twenty-one years, or nearly six-and-a-half millions per annum. We hope the authorities at the War Office will give this matter the serious consideration it deserves! Owners and breeders of horses on a large scale, might also take a hint.

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THE tract of country comprising the Central Provinces has always been regarded as a great wheat-growing district; and we ourselves have been under the same impression. But the statistics showing the relative percentages of the various crops cultivated in the several parts of the provinces, as furnished in the Revenue Administration Report for the past official year, do not bear out this belief. Instead of being a wheat-growing, it turns out to be a *rice*-growing

country. In the Chuttisgurh division, for instance, it is shown that from 65 to 72 per cent of the area is under rice, while wheat does not cover more than 5 per cent. It was therefore noticed as a curious circumstance that the exports of wheat from this division should have risen from 88,315 to 1,07,230 maunds during the last quarter of 1886. This division is considered the most important in the matter of grain cultivation. In Sumbulpore again, the area under wheat is stated to be *nil*, while rice covers more than three-fourths of cultivated area. The wheat-growing divisions are chiefly Jubbulpore and Nurbudda ; then come Hoshaugabad with 71 per cent, Saugor with 59 per cent, with Damoh, Seoni, and Nursingpore having from 41 to 48 per cent of their areas under wheat. Of course this is what Mr. FitzPatrick says, but we are not yet prepared to accept these figures as strictly correct, especially as it is admitted that these statistics are not "perfectly accurate." The information is interesting nevertheless, and of advantage in modifying our exaggerated notions of the wheat-producing capacity of the Central Provinces.

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 7th April, 1887 :—The rainfall has been general throughout Madras, Bengal, and Assam. Slight showers have also occurred in parts of the North-Western Provinces and Oudh, the Central Provinces, Central India, Mysore and Coorg. No rain fell in Bombay, the Punjab, and Berar during the week. No report has been received from Burmah, for the week under notice. The *rabi* harvest is in progress in Bombay Bengal, the North-Western Provinces and Oudh, the Central Provinces, and in Rajpootana, and Central India. The crops have been injured by insects and frost in two districts of Bombay, and in the Punjab the crops throughout the Province have suffered for want of rain, and the prospects are unfavourable. With these exceptions the *rabi* harvest promises fairly. In Madras, Mysore and Coorg the standing corps are good, but rain is wanted in some parts. The rice harvest gives an yield below average in Madras. In Bengal the spring rice is being reaped, and the early rice, jute, and indigo are being sown. The sowing of the early rice in Assam is in progress. Opium collection has been nearly completed in Bengal, and the North-Western Pronvinces and Oudh, and is going on in Central India ; Cotton in one district in Madras has been affected by disease. The harvest yield is below average. Small pox and fever are still prevalent in Madars, Bombay, the Central Provinces, and Mysore and Coorg ; Cholera exists in Bengal and the North-Western Provinces and Oudh. Generally the public health is good. Cattle-disease is reported in Madras, Bombay and Mysore. Prices are falling in two districts of the Punjab, fluctuating in the North-Western Provinces and Oudh, and rising in two districts of the Central Provinces ; elsewhere they are stationary.

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A DESTRUCTIVE kind of blight, or fungus, has been attacking the tea plant in the Dooars with fatal results. Messrs. Jardine, Skinner & Co., have forwarded to the local Agri-Horticultural Society some roots of tea bushes thus attacked, with the accompanying letter :—

"We send herewith roots of tea bushes that have died off on forest land in the Dooars. The bushes thrive well for a time, then suddenly wither, and it is noticeable that in every, or nearly every instance, the bushes that die are adjacent to decaying stumps of trees, felled when the land was cleared of forest. The bushes are from 2 to 3 years old, and as a rule, do well in the soil of the garden. Perhaps Dr. King, or Mr. Wood-Mason, would kindly favour us with their views as to the probable cause of the bushes dying. Can it be fungus from the decaying stumps and roots of the forest trees ?"

The roots were sent to Dr. King who reports upon them as follows :—

"I have carefully examined the diseased tea bushes sent to me, and I have submitted them to Dr. D. D. Cunningham, who makes vegetable blights a special study. The result of Dr. Cunningham's examination of the specimens is, that the root bark has in them all been completely destroyed by a minute fungus. It is extremely likely that this fungus originated in the dead and decaying stumps, which your correspondents say abound in the garden from where the bushes come. But whatever may have been the origin of the blight, it is infectious ; and all tea bushes affected by it should be rooted up and carefully burnt. Beyond this precaution I can suggest no remedy." Tea planters in the Dooars will thus have a new pest to contend against.

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MR. THOSMAS WARDLE, who is at present Chairman of the sub-section silk, in the Royal Jubilee Exhibition, to be held a Manchester in June next, has issued the following circular letter regarding silk :—

"I am at present conducting an extensive series of investigations in the interests of sericulture, in which I should be very much pleased to obtain your kind co-operation, you would greatly aid my honorary work if you would kindly forward me any specimens of eggs, larvæ, moths, or cocoons of silk-producing *Lepidoptera* found in your neighbourhood, or which you can obtain. As these entomological specimens are wanted as much for the interest of science as for those of the silk industy, I am quite as desirous to obtain specimens of those species, the cocoons of which are not at present utilised, as of those which produce cocoons from which silk suitable for commerce can be obtained. In May next I intend, as Chairman (with a most influential committee of silk manufacturers and others of the Silk Section of the Royal Jubilee Exhibition at Manchester), to have an extensive display of objects illustrative of the silks and silk manufactures of all countries, and I shall be glad to receive any help you can kindly give me. Although it is desirable for specimens to arrive as soon as possible, it is not imperative that they should be here as early as May. All researches will be published and assistance fully acknowledged. I should prefer to have cocoons sent, in which the chrysallides have not been killed, in order that the moths may emerge during the Exhibition, as all obtainable species of silkworm moths will be exhibited alive at Manchester, and I am endeavouring to get together a good collection from India especially. The inportance of an extended knowledge of wild silks is very great, and I desire to repeat, that it is quite as necessary to collect specimens of species producing silk which is as yet of no commercial value, as of those which produce silk of industrial utility. Cocoons should, in all cases, accompany preserved moths, or larvæ, and the names be given if known."

We publish the above in the interests of the Indian silk industry, and hope that those of our readers, who have the time and opportunities for collecting moths and cocoons, will send the same to us to be forwarded to Mr. Wardle.

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A WRITER in a local contemporary has "gone" for Mr. D. B. Allen, of the Bengal Agricultural Department, who, we observe, is 'thin-skinned' enough to notice the generalisations of an irresponsible scribe, who apparently has nothing better to do than carp at the working of one of the most useful departments in this presidency. It appears that Mr. Allen recently said that he had "very little to teach the Indian ryots which they did not know already." This sentence was construed by the scribe aforesaid into meaning that *scientific agriculture* has nothing to teach the ryot." (The italics are ours, Ed. I. A.) Mr. Allen has replied as follows :—"I have just noticed in your issue of the 29th a paragraph wherein I am stated to have expressed an opinion that scientific agriculture has nothing to teach the Indian ryot, and I am taunted with retaining an appointment in the Agricultural Department in spite of holding such an opinion. Now, in the first place, I have never said, privately or officially, that scientific agriculture has nothing to teach the Indian ryot. On the contrary, I am one of the few persons who believe firmly that it has, and I ridicule the idea that the poor ignorant ryot is the only member of the Eastern community who has nothing to learn from Western Science. I have said before, and the more I study the subject the more convinced am I, that under present conditions I have, with one or two exceptions, very little to teach the Indian ryot, but that is a very different thing to what your correspondent makes me say. It is very polite of him to call me a scientific agriculturist : I wish I were. Over two years of hard work at Cirencester have only taught me that it takes many years of patient research, combined with practical experiments, and a command of large capital, before any man can venture to assume

such a title. However, whatever I am, and whatever views I hold, I need not trouble to justify my retention of an appointment which gives some extra work and no extra pay. As to my opinion of the various heads of agricultural departments, it is quite easy to justify their existence when you remember that agricultural departments are only nominally so. Their main concerns are with the collection of statistics, and the relations between Government as a landlord, and its tenants, and various other matters, which are only indirectly connected with agriculture. There is nowhere in India, so far as I know, any serious and intelligent attempt being made by Government to bring the knowledge of agricultural science home to the Indian ryot, and till that is attempted there can be no real Agricultural Department." We much regret that Mr. Allen has written in this train, as it is certain to give the captious a legitimate handle to use against agricultural departments throughout India. We are not prepared to admit that "Agricultural Departments are only nominally so," and that "nowhere in India is any serious and intelligent attempt being made by Government to bring the knowledge of agricultural science home to the Indian Ryot." This is, truly, "cutting the branch upon which you are sitting," and if Agricultural departments are to justify their existence, it will not be through arguments such as those used by Mr. Allen in the extract quoted above. One has only to turn over the pages of the last report on the operations of the Department of Agriculture and Commerce, North-Western Provinces and Oudh, to be convinced of the vast amount of good that department has done, and will, we hope, do in years to come. But Mr. Allen is young, and precipitate in his writings and in the expression of his opinions. He will think and write differently, we believe, a few years hence, after he has gained more experience.

FROM a report submitted by the Madras Agricultural Department, we gather that the total area of the early crops harvested up to December last, together with the total estimated yield, was as follows :—

Crop.	Total area harvested.	Percentage of area on which a 20 anna crop was estimated.	Percentage of area on which a 16-anna crop was estimated	Total estimated yield.
	Acs			LBS.
Paddy ...	2,408,586	15·3	33·6	2,576,558 173
Cholum ...	1 938,956	5·5	38 5	679,073 651
Cumboo ...	1,999,723	4·7	31 3	581,743,012
Ragi ...	945,500	4 7	38·7	388 829,253
Indigo ...	331,205	11·1	51·8	6,780,214
Castor and lamp-oil seeds ...	89,223	6·1	46·1	Average production per acre not determined
Gingelly oil seeds,	410,388	5·4	28 2	

It would thus appear that the out-turn of all the crops was very satisfactory, while the percentage of the area in which a full average crops was raised, was nearly 40-per-cent. A sixteen-anna crop is considered a full average crop. The condition of the standing crops is also very satisfactory, and is as follows :—

Crop.	Total area of standing crops.	Percentage of area on which a 20-anna crop is estimated.	Percentage of area on which a 16-anna crop is estimated.	Total expected yield in lbs.
	ACS.			LB.
Paddy ...	2,077,161	10·1	38 9	2,146,508 033
Cholum ...	958,984	6·2	34 1	298,263,698
Ragi ...	211,860	5 8	38 5	91,403,415
Sugar-cane ...	32,711	19·1	44·4	1,264,198

Although the area under sugarcane is not very large, the condition of the plants scarcely leaves anything to be desired. Of the other crops, a full average out-turn of over 40-per-cent of the area is expected.

IN Sweden, the stumps and roots of trees remaining after a wood has been cut down, are being used for the extraction of illuminating oil, by dry distillation. Other products, such as turpentine, creosote, acetic acid, and tar, are also obtained. When mixed with benzine, this oil can be advantageously burned in ordinary benzine lamps. It is reported that this new industry promises to become very important.

THE following statement shows the area cultivated under all the crops, and the percentage of them harvested up to the beginning of the current year ;—

Crop.	Total extent cultivated up to the end of December 1886.	Total extent harvested up to the end of December 1886.	Difference between cols. 2 and 3.	Percentage of cols. 2 and 3.
	ACS.	ACS.		
Paddy ...	5,226,524	2,408,586	2,817,938	46
Cholum	3,419 466	1,938,956	1,480,510	57
Cumbu	2 329,501	1 999,723	329 778	86
Ragi	1 241,593	945,500	296 093	76
Indigo	378 236	331,205	47,031	88
Gingelly-oil seeds	516,079	410,388	105,691	80
Castor and lamp-oil seeds	655 344	89,223	566,121	14
Sugar-cane	40,928	4,315	36,613	11

The area harvested is thus over 75-per-cent. of the total cultivation in the case of cumbu, ragi, indigo, and gingelly-oil seeds. In the case of paddy and cholum, 46 and 57-per-cent. of the area cultivated had been harvested at the end of 1886. The season during the nine months of the year ending with the 31st December 1886, was on the whole favorable, though the north-east monsoon was not satisfactory. The average rainfall during the period was 16 65 inches, which far exceeded that of last year, and that of the preceding five years, by about 3 inches.

MR SMEATON ON INDIAN WHEAT TRADE.

II.

LAST week we expressed our views on Mr. Donald Smeaton's note on the wheat trade of this country. In this paper, we propose to make some quotations from the note to show the grounds upon which he expressed such an unfavourable opinion of the dealings of the European export merchants in Calcutta and Bombay.

Mr. Smeaton consulted a large number of the principal traders in Meerut, Cawnpore and Muzuffernagar, which are large wheat-exporting centres; among others, Mr. Wishart, who represents Messrs. Begg and Sutherland at Cawnpore. This gentleman wrote as follows :—

"As regards the first point, whether cleaned wheat is to go to England or not, this depends on the London and Liverpool Wheat Associations and not on us in India. Cleaned wheat has been shipped again and again, and the experiment has always resulted in a loss, the reason being that the standards are fixed by the average quality of the first few shipments of the season, and if wheat free from small and damaged grain and containing (say) 2 per cent. of impurities only as against the customary 5 per cent. is shipped, it is a special article and can only be sold as such. Again, standard wheat may change hands half a dozen times before it reaches England, while a lot of special quality could only be sold on samples drawn after arrival, thus making the shipper take all the risk of fluctuation both in the wheat market and the rate of exchange. If the London merchants will demand wheat containing only 2 per cent. refraction it can be supplied easily, as there is no grain that is easier to clean. The Calcutta shippers have no one to thank but themselves for the fact that wheat is mixed with dirt and inferior grain by mofussil dealers. For reasons of their own they have established 5 per cent. as the standard of refraction, and if a dealer was to send down wheat containing 2 per cent. they would not make him a pice of allowance for its extra purity Again, it would not pay them if the wheat was brought down absolutely free from foreign matter, as many of them make their profit on the refraction —that is to say, consignments that they class, in taking delivery from the up-country dealers, as containing 6 and 7 per cent (refraction) and pay for accordingly, will pass in London and Liverpool very often as below 5 per cent."

The above places the matter in a nut shell. On a subsequent reference made to him in June 1886, Mr. Wishart wrote :—

"Native and European dealers up-country maintain (in a falling market particularly) that however clean the grain may be, an allowance is always claimed for refraction In the North-Western Provinces and Oudh, the Calcutta shipper is supposed to instruct his staff to get some allowance from the up country dealers in both weight and refraction, and the dealers, to save themselves, are said to keep men down there (in Calcutta) to bribe the shippers' employés to pass the consignment on favourable terms, the consequence being that some are let off easily, while others are cut heavily. If there is any truth in these statements, it is quite easy to understand that the shipper in the long run does not now gain much by refraction, while his action has had the effect of greatly demoralizing and lowering the tone of the trade. My statement that 'many of them make their profit by refraction,' was based on an admission to that effect, made to me some two or three years ago by a large Calcutta shipper, and I was under the impression that the practice was still in force. * * * * The general opinion up-country appears to be

that were there an independent or reliable body in Calcutta, to whom questions of quality and refraction could be referred, business would be greatly facilitated. * * * All the men I have spoken to agree that a great deal of bribery goes on at Howrah in connection with the giving and taking delivery of oilseeds and wheat, and this has had a very demoralizing effect on the trade."

Now Mr. Wishart being 'in the trade' himself, his statements should be received with confidence.

The further we go into this question, the more are we convinced of the shameless nature of the practice adopted by Calcutta and Bombay shippers in setting up a standard of 5 to 6 per cent. of refraction for dirt and adulteration. It is worthy of remark that the native traders who Mr. Smeaton consulted in Meerut and Muzaffernugger were chiefly commission agents, with no real stake in the wheat trade. They had no suggestions to offer; but the only instructive remark which nearly all of them made was that they were afraid to venture to trade in wheat on their own account, because they felt themselves completely at the mercy of the Bombay and Calcutta dealers; that no matter how clean and pure the wheat they sent, they were certain to be mulcted heavily for refraction at the ports, and that, therefore, they preferred to act merely as middlemen between the producer and the exporter, making a small commission, and safe from loss. Mr. Smeaton adds that he is bound to say that all the evidence which he had been able to obtain in the North-Western Provinces and Oudh went to confirm the views expressed by Mr. Wishart.

Mr. Smeaton's own views on the subject are expressed in the following paragraph :—

"*First*, then, in regard to the impurity of the wheat, the consequent high rate of refraction, and the proposal to establish local cleaning depôts for purifying the wheat with a view to reducing the rate of refraction and enabling shippers to send a pure clean article to the European market. There is no doubt whatever that, although considerable improvement has of late taken place, the wheat sent from these provinces to Calcutta and Bombay is still very far from pure. It generally contains a mixture of barley, peas, straw and chaff, and dirt varying from 3 to 6 per cent. It goes down by rail in bags. It is sorted at Howrah; if it shows impurity greater than 5 per cent., the excess (up to 7 per cent.) is deducted from the seller's invoice; if the impurities are over 7 per cent. the buyer has the option of refusing the consignment. For example, a bargain is struck between a Caltutta merchant and a Cawnpore trader for delivery of 500 maunds of wheat at Rs. 2 8 0 per maund. This price, it is understood by both parties, is really for 475 maunds of pure wheat and 25 maunds of impurities. The Cawnpore trader sends down 500 maunds containing impurities to the extent of (say) only two per cent.,—*i.e.*, 490 maunds of pure wheat and 10 maunds of impurities The Calcutta merchant therefore gets 15 maunds of pure wheat for nothing and thereby makes what may be called an unearned profit of nearly Rs. 40, or over 3 per cent. I do not say this is a common occurrence; but it has happened so, and it will from time to time happen again under the existing arrangement. On the other hand, it cannot be denied that the Calcutta shipper has sometimes to pay in London allowances for excessive admixture which he cannot recover from the country dealers. Now this is an evil, but it is an evil that may perhaps be said to be inseparable from the Indian trade as at present carried on. Prices are struck on the basis of a 5 per cent. refraction, and this fact is known to all who engage in the business. An up country trader knows that he must either adulterate the wheat which he sends to Calcutta up to the 5 per cent limit, or if he sends a purer article, suffer a loss in proportion to its purity, which loss may be a gain to the Calcutta shipper. The natural consequence is that the country trader in probably nine cases out of ten does adulterate the grain. But this is not all. It is a regretable fact that, as stated by Mr. Wishart and confirmed by undoubted testimony, agents of the Calcutta shippers do, in their negociations with country dealers, particularly when the market is falling, often strive successfully to obtian unfair allowances both in weight and refraction and that the country dealers, on the other hand, frequently protect themselves from excessive loss by bribing the underlings at Howrah to pass their consignment on more favourable terms then they are entitled to. It is these tricks of the business which are the most damaging, for they give rise to uncertainty and insecurity which cannot fail seriously to obstruct the free course of the trade. In June, 1885, the Calcutta Wheat and Seeds Association passed a resolution that all wheat purchased during the succeeding month of July should be on the basis of 5 per cent refraction instead of 6 per cent which is the customary rate for consignments coming after the 30th June in each year. The country dealers at once combined to defeat this movement on the part of the Association and to restore the 6 per cent rate; they would not sell a bag of wheat at the 5 per cent rate The shippers held out for a time, but eventully had to yield. This case has, I believe, been cited by interested parties to show that it is not the Calcutta merchants, but the country dealers, who prevent pure grain coming to the market. Now I venture, subject to correction, to suggest that the reason why the native dealers refused to accept the 5 per cent rate of refraction may have been, not because they were unable or unwilling to supply wheat of that degree of purity, but because they felt that any such reduction would still further increase the insecurity and risk of their business; for, as they doubtless reasoned, the lower the rate of refraction, the more easy it is to assert, and the more difficult to disprove excessive impurity. In the present state of Indian agriculture the refraction difficulty cannot be altogether removed. The mass of Indian cultivators will, for many years to come, grow mustard seed, or barley, in their wheat-fields, and the grains must get mixed to a greater or less extent at harvest time. Then the grain is threshed out by cattle on the bare ground, when it must get mixed with earthy matter. The custom of sowing mixed seed is, I hope and believe not so universal as it used to be, and every effort is being made to introduce a pure and high quality of seed: but still the custom largely prevails. Under these circumstances, refraction will always have to be considered in the course of the wheat and seed trade. The *real* evil to be got rid of is the insecurity felt by traders and the consequent risk to the trade from the abuse of refraction at the ports. There is, so far as I can see, only one remedy, and that is the establishment at the ports of an independent authority to determine all questions of refraction and classification. The present system of arbitration by members of the Calcutta Wheat and Seeds Association is a laudable effort to solve the difficulty. But apparently, the up-country traders want something more independent than this A committee of mercantile men, aided by an export appointed by Government would probably be a sufficient guarantee to all parties and would restore confidence.

We direct particular attention to the method by which the Calcutta merchant makes *an unearned profit of over 3 per cent* by this refraction fraud.

On the question of local depôts for cleaning wheat, which Mr. Smeaton regards a difficult one, he is of opinion that the tendency of the trade in the N.-W. Provinces is in the direction of decentralization. If the tendency was to concentrate at a few large central marts on the line of rail, "I would," he says, "be disposed to recommend establishment of cleaning depôts at these marts: because by such an arrangement the local exporters would be enabled to clean their wheat down to a certain refraction standard and thus satisfy themselves that their consignments were strictly up to the quality required for export. But the tendency of the trade is exactly the other way. Instead of concentrating at large marts, it is daily becoming more and more scattered. The concession by the railway companies of special freight rates for minimum consignments of 10 tons has encouraged export by driblets; and now, during the season, local export goes on from almost every railway-station. It would scarcely be possible to establish cleaning depôts at all stations. The expense both in prime costs, maintenance and supervision (which is indispensable) would probably be too great. Therefore in lieu of small local cleaning depôts, I would recommend the establishment at the ports of large cleaning and storing depôts."

Mr. Smeaton then notes that America is India's most dangerous rival in the wheat trade and compares the resources of each country, showing that the Indian rate of carriage by rail is 25 per cent higher than the American; that American wheat is carried to New York pure and clean, and in exportable condition, while the Indian grain is weighted with 5 per cent or more of pure ballast. That the American grain is carried in bulk, *i.e.*, loose in the cars, while the Indian is carried in double bags; again, that the former receives the least handling possible, while the latter is handled in a multitude of ways, both at starting and at its destination. It is, therefore, in these essential features of the trade that an improvement must be made before Indian wheat can expect to compete successfully with American. Mr. Smeaton lays it down as a fundamental requirement, that what we have to do is to see that the grain sent to England is in a condition to take an independent place in the home market, and that its cost, landed in London, shall be such as to defy foreign competition. The first step towards the consummation of this end, Mr. Smeaton thinks, is to alter the present system of carriage in bags to carriage in bulk, whereby a saving of one rupee or 10·5*d.* will be effected, and if the grain was carried by sea in bulk also, he calculates a total saving in freight of 1*s.* 7⅝*d.*, thus enabling Indian wheat to be landed in London at 30*s.* 3·18*d.*

The arrangements proposed by Mr. Smeaton to remedy the present unsatisfactory state of things are briefly as follows:—The railway companies to set aside a portion of their spare grounds and to erect sheds for receiving the grain in bulk, each agent to have a compartment to keep his consignments separate. The grain to be loaded up into the waggons in bulk by means of baskets. Further, that special waggons should be constructed for the conveyance of wheat in bulk, having openings in the floor, so that on arrival at port of shipment, the grain could be

shovelled out through these openings into a contrivance specially constructed, so that the grain while passing through this 'shoot' or sieve, would clean itself of dirt and small seeds, leaving the clean wheat to pass out at the base either into bins for storage, or into cargo-boats for immediate conveyance to the ship or steamer. "The important results," continues Mr. Smeaton," which would accrue from carriage in bulk in the way described are —(1) a large saving in freight and handling; (2) greater carrying capacity in the railways; (3) partial cleansing of the grain in the very course of its loading and carriage in bulk; (4) complete cleansing of the grain at the terminal station through the shoots; (5) reduction to a uniform *minimum* of the refraction; (6) consequent highly improved condition of the grain sent to the London market. The full saving of 1s. 7¾d. per quarter landed in England would, of course, greatly depend on the shipping companies consenting to caary the wheat in bulk. But if the trade took a decided turn in that way, and the advantages of the new departure became apparent, the shipping companies would not be slow to make arrangements to suit the advancing trade. It is, however, of primary importance that the London market should definitely fix the degree of purity, *i.e.*, the refraction of Indian export wheat. London is the buyer, but she is in reality in ignorance of the capabilities of this country. The London merchants imagine that nothing under a 5 per cent refraction is possible, and they determine the standards from the first few shipments of the season." It is with reference to the concluding portion of the above remarks that Mr. Smeaton recommended the appointment of an authoritative committee of mercantile men at the ports of shipment, aided by a Government expert, to fix the standard of refraction.

We shall make one more quotation,which we commend to the serious consideration of all interested in the development of the Indian wheat trade. Mr. Smeatan says :—" If the London trade were aware that a 2 per cent refraction was not only possible, but under a system of carriage in bulk and self-cleansing at the port, cheap and easy, it is not to be doubted that they would fix the standard at 2 per cent, and that Indian wheat would rise in the European market. A very direct stimulus to higher-class cultivation in this country would be given, and *the one thing needful* would be supplied, *viz.*, the motive of self-interest in up-country traders would be brought into active operation and would re-act on the Indian cultivator in a way that no department of agriculture or any other power on earth can act Let the desire and certainty of gain from trading in a high quality of wheat once firmly get possession of the Indian village trader, and it will not be long before the Indian cultivator takes to sowing pure seed, cultivating the best varieties, keeping his wheat separate from other grains, adopting improved methods and economies in his cultivation, and developing into what no unaided department of agriculture can ever make him,—a keen, enterprising, intelligent, clever, and thrifty farmer."

DEEP OR SHALLOW PLOUGHING.

The advantages of deep over shallow ploughing have been maintained and reiterated by farmers and agriculturists of long experience and undoubted ability; but the question that is now agitating the agricultural community in the United States is whether these advantages have not been over-rated. In this country, however, experience and experiment so far point to distinctly favourable results attending deep ploughing as compared with the method adopted by the native cultivators to plough their fields, which cannot be described as anything more than 'scratching' the land. But it is always well to hear both sides of a story; and instead of condemning shallow tillage right off, it might be worth while investigating whether deep tillage will in all cases yield results superior to shallow tillage. We have been led into this suject after perusing several letters which have recently appeared in American journals on the advantages of *shallow* ploughing. We reproduce one of these letters below, addressed by a correspondent to our Chicago exchange. The writer says :—

I see in the *Farmers' Review* of January 5, from Grundy, Illinois, an article on corn raising, with which my views and experience do not accord. The writer of the article has had a long experience (more than three-score years and ten) and his experience and long life is entitled to due respect and consideration. But nevertheless I am compelled to differ with him. Why don't farmers get better crops of corn he asks. From 15 to 30 bushels is about what they do get Now, A. R thinks the remedy lies in deep ploughing. I will give your many readers some of my experience. I was a firm believer in deep tillage (or deep ploughing) Sixteen years ago I ploughed a piece of ground about nine inches deep, about 15 acres, in the fall. It was ploughed and planted by the 15th day of May. The season was very dry. I attended and cultivated that piece of corn well, had no weeds in it to speak of, but at gathering time it hardly came up to A. R's. standard yield, probably about 25 bushels to the acre I think it was the poorest piece of corn I ever raised since living where I now do. This crop of corn caused me to think, and try and find out the cause of the poor yield. I was not yet converted from my deep ploughing. Now, Mr. Editor, bear in mind my ground was black loam from 10 to 20 inches deep, just such land, as A. R describes. About two years after I rented 21 acres of growing land, adjoining a piece that had been cropped for several years in corn, and was what we term thin, poor meadow land. I sent the man to plough in that piece with a three-horse,sixteen-inch plough, told him to plough it up well; let the plough down. I had a stout team, and went to see how he was getting on after he had been ploughing two or three days "Why," I said,"you are going down." He was ploughing from 10 to 12 inches deep A neighbour of mine was ploughing a piece adjoining mine, same kind of land, two or three inches. I thought I would leave him far in the rear at gathering time The result was I had about 25 bushels to the acre, while my neighbour had about 40 bushels per acre. I could multiply instances that have come under my observation where deep and shallow ploughing have worked out results as stated above. I now try to have my ground ploughed about four inches deep and have raised 80 bushels of corn per acre. Last year my corn yielded 50 bushels: the season was very dry. I think 50 bushels is only a very moderate crop. We should raise 60 to 75 bushels on this black loam, and I think we can with good cultivation, and manure and clover.

It will be seen from the above that the writer regards 50 bushels per acre "only a very moderate crop," and this he got by substituting shallow for deep ploughing The editor of the journal in which the above appears, says in a foot-note: "Deep ploughing should be done in the fall (equivalent to our autumn sowings, which yield the *rabi* crop.—Ed., *I.A.*) bringing up the crude under-soil and exposing it to the action of the sun, air, and frost during winter, which will fit it for plant-growing. There are many farmers who could tell the same experience as the writer of the foregoing, as to the effect of deep-ploughing in spring (equivalent to our *kharif* or spring sowing.—Ed., *I. A.*) and seeding upon the crude soil for the first time exposed to the action of the elements."

This may be true so far as America is concerned; but we should like to hear of an experiment in India, in which the two methods were tried side by side, under precisely similar treatment, so far as manuring and irrigation are concerned, both for *kharif* and *rabi* crops. The trial might yield interesting results, and show us that the Indian ryot is not, after all, so very far out in his time-honoured method of shallow ploughing.

DATE CULTIVATION IN INDIA.

Dr E. Bonavia went home on sick leave a few months back, but even while supposed to be seeking that rest and quiet so essential for the recoupment of his energies, this indefatigable advocate of date cultivation in this country, even while sojourning in the quiet town of Bournemouth, has been occupying his time and leisure by writing more about this important tree, for the enlightenment of the 'Benighted' presidency. Thus the Doctor has addressed the following interesting letter to the Agri-Horticultural Society of Madras on this subject, while incidentally he alludes to the cultivation also of the prickly-pear tree :—

In a recent letter from Mr. Thiselton Dyer, Director of the Royal Kew Gardens, regarding date tree culture in India, he says: 'I am sure the enterprise you have undertaken is a sound one, and I have done my best to back you up. You have set the ball rolling, and it must now rest with the Botanical officers in India to keep the game going.' He added that 'Mr. Stevenson, the honorary secretary of the Agri-Horticultural Society of Madras, will, I am sure, take up

the Date question if you put it before him. He is very keen on Prickly Pears.' On the strength of the Director of the Royal Kew Garden's letter, I take the liberty of writing to you and putting this important enterprise before you. I may mention that the various Governments of India, understanding how warmly the Director of Kew Gardens has taken up this subject of Date culture, in India, have already done a great deal towards realising this object. Mysore, Hyderabad, Central India, various States of Rajputana, the North-West Provinces and Oudh and also the Punjab have taken up Date culture seriously. They all have imported large quantities of Date seeds and off-sets from the Persian Gulf. The Executive Engineer of the Jeypore State only a few days ago wrote to me to ask how he might possess himself of ½ a ton of good Date-seeds for the Jeypore State. I have been corresponding with Sir Lambert Playfair, Consul General of Algeria and Tunis (Algiers). He is an old Indian Officer and has taken great interest in this enterprise. He says he has already sent a supply of first-rate seed from the Dejereed in Tunis, enough to plant half India, and adds that there is 'really no necessity for sending suckers, as the experience of Arabs in Algeria shows that seeds produce as good fruit as suckers'; this has also been the experience in Oudh. Before leaving India I sent to Kew a collection of Dates, the produce of seedling trees of the Oudh districts.

They were all very fine, and the finest those the trees of which had received some cultivation. Sir Lambert Playfair adds that 'the only objection of seeds is that they give an undue proportion of males.' Far from this being an objection in the case of India at first it will be an advantage. Owing to excess of males, the females will be naturally fertilised. Artificial fertilization is yet unknown in India. In due course India will possess a large selection of fine varieties of Date trees, and then it will have its own suckers and can make plantations of females alone. I have more faith in seeds than in suckers, although the latter, when possible, should be also introduced at head quarters in order to have the identical fine varieties of other places. Seedlings, however, are hardier, and will adapt themselves to the various soils and climates of India more readily. I do not know what has been done in South India with respect to Date culture, further than that a vernacular pamphlet of mine on Date culture has been translated by Government into the vernaculars of South India with the view of popularising the notion among natives. I know that at Bangalore, both seeds and offsets have been imported. Can you kindly inform me whether any steps have been taken in the matter on the Madras side, as have been taken elsewhere? The Collector of Tanjore, some time ago, wrote to make inquiries about Date seeds, &c. I think all the Eastern side of Southern India which is not touched by the south-west monsoon, but only gets the North-East monsoon in October, is admirably suited to Date culture. The crop is ripe in September. I am sure if the Agri-Horticultural Society of Madras would take an interest in this enterprise and ventilate the subject and obtain seed either through the Government of India or directly from the Date countries, a vast deal of good may be done. But the importation must be carried on year after year in quantity for at least 10 to 15 years in order to make any impression on the food products of the country. Wherever the wild date tree grows, I feel certain the cultured varieties can also be grown. All along the Madras Railway and Great Indian Peninsular Railway to Bombay, I have seen in the nullahs little forests of wild Date trees; the black soil along the line appears to suit Date trees. I hope earnestly that you may see fit to induce your Society to take up Date culture. It promises well in many parts of India, and it is a thing well worth accomplishing, not only as a cheap food for the million, but also as a first rate famine tree. Moreover, if not utilised for fruit, it is a tree which can be turned to many other accounts. I do not know whether you have seen a little book of mine on 'Future of the Date-tree in India,' published by Messrs. Thacker, Spink and Co., Calcutta, at Rs. 2-8. I have no pecuniary interest in its sale.

The Prickly Pear tree is another which I think is well suited to South India, either grafted on your wild one or its own roots. It is cultivation that produce fine fruit in any tree. I should much like to know what success you have met with the Prickly Pear tree in Madras."

Miscellaneous Items.

GERMAN agriculturists we are told are getting anxious over the enormous influx into their country of corn and rye—principally the latter—from Russia. They fear that should the rouble sink further in value these influxes will considerably augment, very much to the detriment of home producers. The last increase of the corn duty appears not to have had anything like the desired effect, and it is reported that if German farmers should send a petition to the Reichstag, as they purpose doing, the later, taking into consideration the proposed increase of the Russian duties on iron, would not be unwilling to further elevate the corn import tax.

KUMAON apples appear to be making headway. A contemporary writes: "Since the stoppage of the importation of apples from America in the ice ships, a great impetus has been given to the opening of apple orchards in the Kumaon district, and the specimens of the fruit sent for sale have met with a general approval. The Government gives every encouragement to the extension of the orchards by growing apple and pear trees from grafts and seeds, and last year nearly five thousand of the former and three hundred of the latter were distributed from the Government orchards. The demand for trees comes from natives of all classes, and is so great that it has risen beyond the power of a Government orchard to supply at present."

THE American export trade in wheat would appear to have increased by "leaps and bounds" last year. Our Chicago exchange writes:—"The late Report of the Government Bureau of Statistics shows that our exports of wheat from the last crop are considerably in excess of those from the crop of the previous year. The amount exported in January 1886, was 4,018,808 bushels. In January, 1887, the amount was 8,056,661 bushels. For the seven months ending Jan. 31st, 1887, our exports of wheat were about 69,500,000 bushels, against 24,500,000 bushels for the corresponding period of the previous year. Including the flour exported, at its equivalent in wheat, the total export for the seven months ending January 31st, 1887, amounted to 89,450,319 bushels, against 44,976,502 bushels for the seven months ending January 31st, 1886. If this rate of export continues, our surplus of wheat will be pretty well reduced by the time the next crop is ready for market."

AN American exchange describes an instrument for determining whether 'butter is butter' or oleomargarine. It is "a little glass tube, half an inch in diameter and six inches long, having degree marks on its circumference. With it is a tin tube an inch and a quarter in diameter. To make the test, the tin tube is filled with water heated to a temperature of 180 degrees, and the glass tube is filled with the article to be inspected. If it is genuine butter the result will show the butter to melt to a liquid oil, and in the bottom a whitish curd of cheese will be deposited to the amount of about three-tenths, as indicated by the scale marked on the tube, and the remainder of the contents will be pure oil. In the case of a test of butterine the result is quite different. The same process is gone through with, but the percentage of deposit of the curd is very small, and tiny flakes of the lard used in the article's composition will adhere to the sides of the tube, and the greater portion of the tube's contents will be oil, quite different in appearance, as the butter oil is transparent and the butterine oil is translucent. Armed with a little detective of this sort, the special examiners will have but little difficulty in discovering the violators of the new law." It would serve, we think, very well for testing the purity of *ghee*, which is largely adulterated with animal fat.

Selections.

DIAMOND DIGGING IN THE DECCAN.

THE diamond expert sent to Hyderabad by the Hyderabad (Deccan) Company has reported the results of a careful examination of the old diamond workings on the Krishna river in the eastern portions of the Nizam's territory. The workings are very extensive, some being five miles in length. They are all of a superficial character, not extending beyond fifteen feet from the surface, wherever water or rock was met, the native workers could not compete with the difficulty. The soil indications are said to be extremely satisfactory, and in many places similar to those found at Kimberley and elsewhere in South Africa. Although the diamond workings have not been carried on since the beginning of the century, a few individuals still employ themselves in re-washing the old *débris*, and the expert was shown one or two small diamonds found by them of fairly good colour. His account of the primitive method pursued by an old native Purtyal, who was, however, very reticent as to the results, is interesting:—

"He first carried about a square foot of *débris* to the water's edge and deposited it in a hold in the ground about two feet deep, and then threw water over it and puddled ground with his hand; he then let the muddy water run out of the hole, and put in fresh water, repeating this over and over again until he had extracted a small portion of the earth and sand. He then took out the soil that remained, which was very nearly in the same state as it was when he commenced washing, and laid it out in the sun to dry. When thoroughly dry he put it in a basket, held it over his head, and allowed soil to drop slowly to the ground; he did this so that any sand, &c., should be blown away by the wind. When he had done this several times he searched the remainder to see if there were any diamonds. If a man worked hard and regularly (which the natives never do) he might get through a 16 foot load in a month, and then be quite likely to pass over diamonds, as their method is so defective in every possible way; however, the above is the way in which the ground always has been worked, and they know no other. It must pay the man, otherwise he would not continue working and many others would take it up as a trade, if they knew a diamond when they saw it. Those that do know them will not teach others and so the industry has gradually died out. As the natives never excavate any virgin ground I am of opinion that they have gone on washing the same *débris* generation after generation; if that is correct the ground in its virgin state must have been very rich indeed, but even if it only yielded one small stone of ¼ ct. per 16 cubic feet, it would be a very valuable property, and pay very large profits indeed. It is hardly necessary to ask why the natives do not excavate virgin ground; their laziness and want of energy is past all belief. I have questioned thoroughly all the natives in the district as to reasons for work having been stopped. The idea of the mines being worked out they think is absurd; they say that when the largest pit (No 1) was worked to great depth and they had got to and gone below large rocks, &c., the water burst into the pit and a great number of men were drowned. Since that time the pit has never been clear of water, besides which they had no inclination to go into such risky work. This, I think, may be the reason for the work having been stopped in deeper pits, but

it would not explain the cause for no work having been carried on in very shallow pits. From information I have gathered in the district I think work was stopped in the latter through the oppression of the rulers; not only was every diamond over ten carats to be the absolute property of the Nizam, but licenses had to be paid for to the crown by every man that worked, washed, dealt in, valued or sold diamonds; in fact, the people were ruled in such a despotic way, it is not at all surprising that the industry was crushed out. Many of the pits in the Krishna and other districts were worked up to about eighty years ago, but since that time I can find no traces whatever of work having been done. It was about the same period that the Nizam then on the throne was severely defeated, and the whole country thrown into a perfect state of chaos, and industry of every kind was at a standstill. Add to this the want of energy of these people, who when they meet with difficulties of any kind, simply sit down and do nothing, and I think you will have the correct reason for the work having been stopped."

By the 26th January the expert had again started from Secunderabad for Purtyal, with a convoy of 80 bullock carts, carrying all the necessary machinery for testing and working the different places described by him. He states that he hopes to be able shortly to send a further report "in the shape of a parcel of diamonds." He adds.

"It is of course not in my power to be able to say with any certainty that I shall find diamonds in payable quantities, but I do not suppose for one moment that the diggings are worked out, particularly as the natives have not worked the ground regularly, but have left, ground untouched between all the pits, which are of the same soil and therefore just as likely to be diamond-bearing as the pits themselves." He concludes:

"I have every confidence in the venture, but do not like to be over-sanguine, and as it will not be very long before the ground will be thoroughly tested, I prefer to confine myself to saying that the chances are very much in favour of everything turning out satisfactorily. It may be of interest to you to know that in all the Kistna villages, excepting Purtyal, which is on the high road, there has never, in the memory of living men, been a white man, so that proves plainly that no prospecting or anything of that kind has taken place within the last 80 or 90 years. With regard to working any of those places, there are no difficulties of any kind; labour can be very easily obtained, also fuel and water, and should the pits, full now, be required at once, it would be an easy matter, comparatively, to drain and pump them dry.—*Pioneer.*

THE TEXTILE INDUSTRIES OF RUSSIA.

The principal industries in Russia are centered in the government of Moscow. For instance, out of sixty-eight wool manufactories producing goods to the amount of £517,300 yearly, and employing 4,789 hands throughout European Russia in 1884, thirty-two manufactories, producing spun wool of the value of £393,800, and employing 3,637 workmen, were situated in this province. The manufacture of carpets is almost entirely confined to the government of Moscow. Of nine manufactories producing goods of the annual value of £55,000, and employing 802 workmen, the province of Moscow contains seven manufactories, producing carpets worth £50,000. For the production of felt there are 10 manufactories in the government of Nijni Novgorod, employing 315 workmen, and with, an output worth £19,500. For the manufacture of cloth there are in European Russia 390 establishments, employing 48,000 work men, and producing cloth of the value of £4,070,900. Besides this, there are in European Russia 190 manufactories of light tissues in pure wool and mixed with cotton, flax, and silk. In 1884 these manufactories possessed 14,500 looms, employing 19 000 work-people, and with a production of goods amounting £2,112,500,169 of these manufactories with 13,882 looms, and a produce of £2,050,000, are in the government of Moscow. The manufacture of spun goods employs 67 establishments which have a population of 1,500 workmen and a production of £105,100. With regard to this industry also the government of Moscow holds the foremost position. There has been a very considerable development in the cotton industry. The number of spinning manufactories shows an increase in 1884 to 661, as against 623 in 1883 in European Russia, and of 240 in Russian Poland as against 232 in 1883. The number of workmen employed in this branch of industry has risen during the same period from 19,000 to 22,700 in Poland, and from 181,000 to 199,500 in other provinces. The number of cotton-spinning establishments in European Russia was 57 in 1884; there were about 3,200,000 at work, which employed 116,494 workmen. They produced goods exceeding the value of £11,250,000. The government of Moscow possesses 25 manufactories, employing 41,000 hands, and producing annually goods valued at £3,452,000. There are 488 manufactories for cotton goods, with 58,865 looms and 80,500 work men. Their annual production is estimated at £5,596,000, made chiefly in the government of Vladimir; the product of the 50 manufactories approaches £2,000,000; whilst the 342 manufactories situated in the government of Moscow scarcely produce cotton goods of the value of £1,747,100. There are 24 flax-spinning establishments with 185,000 spindles, and employing 20,780 workmen. Their production in 1884 was valued at £1,527,200. Silk industry has been making rapid strides in the last few years, but is almost entirely confined to the government of Moscow, where in 1884 there were 148 large silk manufactories, with 8,874 looms, employing 10,845 work people, and producing goods of the value of £762,500.—*St. James's Gazette.*

CINCHONA IN JAMAICA AND JAVA.

In our last issue we gave an illustration of the extraordinary depreciation in the value of cinchona, by quoting the prices realised by Jamaica cinchona some five years ago, together with the figures paid for similar bark at a recent public sale. The Jamaican cinchona plantations, according to a Government report recently issued, have suffered much during the year 1886 by excessive rainfall, which has developed a tendency to canker among the trees. A great many plants in consequence lost all vitality and had to be cut down, the *Ledgerianas* experiencing comparatively greater damage than any of the other varieties, a confirmation of the view that this species is not so well adapted for growth in Jamaica as are the *Officinalis*, *Succirubra*, and hybrid cinchonas.

The extent of the Government cinchona plantations now amounts to 142 acres, which during the year under review, yielded 12,541 lbs. of bark. This bark was partially dried at the gardens, and then forwarded to the central establishment for final preparation prior to despatch to Europe. In all probability the shipment recently disposed of by public sale consisted of the 1,254 lbs referred to and, if that should be the case, some time will probably elapse before we shall hear of further arrivals from that island.

Many cinchonas on the Jamaican plantations have been destroyed by the storms which visited the island in August, 1886. There is a fair demand for cinchona seedlings among private planters, and last year 56,953 young plants, besides 197 oz. of seed, were sold from the Government gardens; but only the rarer varieties, such as the *Ledgerianas*, are now propagated to any considerable extent.

The British consul at Batavia has just furnished some additional information regarding the extent of the cinchona plantations in Java. The statistics given by the consul have been placed in his hands by the Planters' Association in Java. According to the estimate of this Society, the number of trees privately planted is 30,000,000, covering 21,000 acres 14,000,000 of the trees belong to the *Succirubra* variety. The crop for 1887 is estimated at 1,433,250 lbs., and the average proportion of alkaloids extracted from the bark is about 3 per cent. At the end of September, 1886, the Government plantations contained 3,430,700 plants, about one-half of which, *viz.*, 1,249,000 *Ledgeriana* and 560,000 *Succirubra* were in the nurseries. The plants in the open were divided as follows: *Ledgegeriana* 755,700, *Calasaya* and *Hasskarliana*, 4,000; *Succirubra* and *Caloptera*, 556,000; *Officinalis*, 234,000; and *Lancifolia*, 8,000. The acreage under Government cultivation in 1886 is not given, but in 1883, the last year for which returns are available it amounted to 1,778 acres. Our consul at Batavia believes the statistics to be correct, but there has always been a considerable, reticence on the part of the rival planters, in Ceylon and Java to furnish each other with reliable data concerning the extent of their respective plantations. It is stated that recently the Ceylon Planters' Association formally requested the Chamber of Agriculture in Java to provide them with statistics of the Java cinchona plantations. The Java Association expressed their willingness to accede to this request, and at the same time intimated their desire that the confidence should be reciprocated by the Ceylon people. The Latter, however, *it is reported, stated* that it would not be possible for them to do so, on the ground that the Ceylon plantations are of a very scattered nature, and the plants so unevenly distributed that any figures relative to the number and acreage would be misleading. Under the circumstances it was thought that the Java planters, on their part, would also decline to afford statistical information; but if the consul's figures are correct they appear to have since reconsidered their decision. —*Chemist and Druggist.*

AUSTRALIAN FROZEN MEAT TRADE.

The frozen meat trade may now be looked upon as fairly established, and should become one of considerable importance. The rapid increase in our flocks and the enormous resources of these colonies necessitate an outlet for our surplus stock. This is obtainable through the export of frozen meat, for which a good market has now been established in Great Britain, while the opening thus offered should lead to a large increase in this trade. Up to the present New Zealand, where the industry is firmly established, has been the largest exporter. Last year 427,193 frozen carcases were sent away from the different ports, being a considerable increase on the number sent away during 1885. With the steady and large increase in the flocks in Victoria and New South Wales, as well as in the other colonies, there is no reason why the trade here should not assume considerable proportions. In fact, *it is of great* importance to all interested *in pastoral pursuits, as affording a ready* and certain outlet for their surplus stocks, and according to the present arrangements both formers and squatters can ship on equal terms. The heavy expenses entailed, no doubt, have greatly interfered with the success of the trade, but as experience has been gained these have from time to time been reduced. The Melbourne Refrigerating and Agency Company have taken another step by which a considerable reduction is made in the London charges. Till recently the meat was sold to the wholesale dealers, but now arrangements have been made with one of the largest butchers in Smithfield to sell the meat on arrival. By this course the London charges are reduced from 4 per cent to 2½ per cent. Besides this reduction, the produce is thus brought one stop nearer to the consumer, and will be certain of obtaining the full market value. The effect is already noticeable, an advance of ⅛d per lb. having been obtained for the first shipment sold in this way. The company are to be commended for their rather bold action in deciding to deal with the trade direct, which has, in this instance, resulted beneficially, and should continue to do so. Although prices are now fairly remunerative as compared with

those ruling here at times there have been considerable losses incurred by shipping to England. Some months ago, owing to the depressed state of the home market, exporters were facing a certain loss, but they continued to ship so as to mantain the trade. Their unselfish acting deserves great credit, as otherwise shipments must have ceased at all events for a time, and a certain position in the trade have been lost. As stated above the trade is of great importance to this colony especially as its development would tend to increase the general prosperity not only in yielding larger returns to those interested, but by giving increased employment within the colony. Now that a fair start has been made, and shippers have seen the advantage to be gained, a large increase in the trade should take place. In fact, other steam-ship companies are, we learn, commencing to fit out their steamers with refrigerating chambers. It is to be hoped, therefore, that the competition may have the result of reducing the frieghts, which at present form a very considerable portion of the total expenses incurred between the producer and consumer. To make the trade a large and permanent one, every inducement should be offered to shippers and others interested, especially at first, and should the companies see their way to make a reduction in the *freights* it would materially assist them, and help to make the industry a permanent one.—*Melbourne Argus.*

NITRATE OF SODA: ITS USE AND ABUSE.

By Cambuslang.

CLIMATIC CONDITIONS,

Where the spring months are dry and the rainfall light, nitrate of soda may be applied to all crops requiring such during cultivation or seeding, or if they are already growing, as soon as growth has fairly set in.

Should the drains, however, continue to run freely, and rain be more or less frequent (particularly heavy rains), nitrate of soda should be applied to nothing but a growing crop. If the monthly rainfall be from 3 to 5 inches or over, all manurings of nitrate of soda should be as light as possible, not exceeding 56 lbs. per acre, and be applied only to a growing crop, repeated manurings being given at short intervals of from fourteen to twenty-one days, until the crop is sufficiently advanced, or enough has been given.

In all manurings with nitrate of soda it must be particularly kept in mind that the application both in quantity, manner of use and time, must be altered according to the crop to which it is applied, and particularly according to the climate in which it is used. In a wet climate, or one having a summer rainfall of 2 inches or over per month, the disolved nitrate of soda by drainage and diffusion very readily passes downwards, as there the movement of the moisture of the soil is always in that direction, unless during a very short period of a dry summer. On the other hand, in a dry climate, or in one having a less monthly summer rainfall than 2 inches, the movement of the moisture in the soil is generally from the sub-soil to the surface, capillary attraction and the roots of the plants conveying it thither, so that, leaving differences of growth of plants altogether out of account, we have here circumstances exactly the opposite to each other, in which it is desirable and necessary that nitrate of soda should be used. Each user, therefore, must alter his mode of application, not only according to the wants or nature of each class of plants he may grow, but even according to the different circumstances under which each is grown. It will not do to expect a full crop of wheat because a few cwts. of nitrate of soda were applied to the soil in autumn, even in a dry climate, much less in a wet one, or to expect a full crop of turnips because a certain amount was sown in the drills at seed time. Again, at no time and to no crop apply nitrate of soda late in the autumn. In very dry climates do not be afraid to let the nitrate go to a considerable depth during cultivation, more particularly if the crop is a deep-rooted one, as you are thereby more likely to have a healthier and heavier crop

To all crops, particularly cereals and root crops, to which it is intended to apply nitrate of soda, give a good manuring of kainit and superphosphate, put on during the autumn or winter, as unless potash and phosphoric acid be present in sufficient quantity, the nitrate will in great part be lost. To the heavier class of soils superphosphate, should be principally applied, and potash, or potash and superphosphate to the lighter ones. By so doing is it only possible to grow full crops, and full crops are the only ones which are remunerative. In very late districts, or to crops likely to be late in ripening, keep the amount of nitrate of soda at the very lowest minimum likely to produce a full crop, as under such circumstances its excessive use, through delaying ripening may do more harm than good.

WINTER WHEAT

Wheat was at one time supposed to be one of the most exhaustive farm crops grown, the growth of which, to be successfully carried on, must be alternated with fallow or root crops. Under the influence of scientific knowledge aided by methodical experiments, carried out during the last forty years, it has been clearly elucidated that wheat is not what is generally called an exhaustive crop, that it is not near so exhausting as roots, and that it will yield on poor soils a moderate return, whereas roots would be grown at a loss. This is clearly proved in the rotation, unmanured, and fallow experimental plots at Rothamsted, at the Woburn experimental station under the Royal Agricultural Society of England, and by the results of the experimental stations of the Highland and Agricultural Society of Scotland, and others. It has been found that ordinary wheat land in average condition is capable of growing fair crops of wheat for many years in succession, without any manure being applied, if the land can only be kept clean. The cleaning of the land is the great difficulty, not the getting of a fair crop, and, of course, when weeds become established, a fair crop cannot be expected, and then roots or fallow must be resorted to, to get the land clean again.

Wheat has, comparatively speaking a long growing season, and is, besides, a very deep-rooted plant, so that it is thereby enabled to pick up what manurial substances it requires slowly but surely, while the root crops generally have a very short period of growth and, with one or two notable exceptions, are mostly shallow rooted plants, so that their food must be provided for them in ample abundance, and concentrated in a more shallow depth of soil than for the wheat plant.

As in most soils at all capable of cultivation under the ordinary rotations of cropping, the mineral ingredients of plant food, *viz.*, phosphoric acid and potash, are more or less *abundant*, nitrogen being principally required to give a moderate return; it follows, therefore, that the application of no manurial substance has so marked results on wheat or the cereals generally as that of a nitrogenous one, and in no manure can it be had in so effective a form or so cheap as in nitrate of soda. Applied in quantities of from 1 to 2½ cwts. per acre in small portions, or in larger ones, according to the climate and at suitable times, the money expended in nitrate of soda may be easily doubled in an average harvest, and with good years it may be trebled. Granting that there are a sufficiency of minerals in the soil, either naturally or applied, success or failure will in great part depend on applying the manure in a fine state of division only, and so distributed over or through the soil that only very small quantities of it can be taken hold of by the roots of the plants at one time. The great secret of all kinds of manuring is always to have a sufficiency within easy reach of the roots during the period of most active growth, and then to so regulate matters that, as the plants attain maturity, the supply of active stimulating manure shall become almost exhausted. These dressings of nitrate of soda should only be applied after the drains have ceased to discharge other than their normal summer quantity, or if applied earlier for any particular reason the supply should be very small and often repeated. In former years, by inattention to or ignorance of these details, enormous losses were made in the application of nitrate of soda, not only to wheat but to all kinds of crops.

Before using, it should be broken fine enough to pass through the mesh of a wire riddle, not wider than three-eighths of an inch, all lumps being broken and re riddled until small enough to pass through It may then be mixed with an equal or other quantity of dry earth, sand, salt, kainit, or other bulky substance, and turned over once or twice, when it will be ready for sowing. If the manure can be equally distributed over the land by hand or machine, it is not necessary it should be mixed with any other substance; but when it is sown in small quantities, such is rather difficult to do. Many men who have had a fair practice at the work can easily distribute one cwt. or less very evenly over one acre, and where such men can be got they are preferable to machine sowing for either large or small quantities.

If the climate is a very dry one, the manure should be applied as soon as circumstances will permit, and all at one time, it then becomes slowly dissolved by the moisture in the soil, any rain which may fall and the dews. Under such circumstances, even such a readily soluble manure as nitrate of soda is but slowly dissolved, and occasionally not at all. Nitrate so applied may appear all dissolved in the morning, but as soon as the sun has come out and thoroughly dried the surface soil it will again become visible on the surface in the shape of very fine crystals, almost like flour. In a locality only moderately dry, it is a good plan to give all manurings of nitrate of soda at twice, unless it is thought necessary only to give one very light dressing. By giving at twice a trifle more labour is incurred, but loss through drainage is prevented happening to any great extent, and the crops are more regularly and efficiently nourished. In districts, however, such as the greater part of Ireland, the west of England, and all Scotland but the eastern seaboard never more than from ¾ to 1 cwt. of nitrate of soda per acre should be applied at one time. The first and lightest manuring should be applied in spring, as soon as the dry weather has undoubtedly set in, and growth has fairly begun? let it be a little later if uncertain, but not before. No fixed date can be given, as any date which might be suitable for one district may be quite unsuited for another in the same or a different section of the same county; and even any date which might fairly well suit a certain district one year, may be altogether unsuitable for it the very first year following. The great point to aim at is not to manure until spring growth has fairly begun and the greater portion of the superfluous water of the soil has passed off by drainage or evaporation. The second manuring should be a little heavier than the first, and may, according to season and circumstances, be applied about three or four weeks after the first. If necessary a third very light manuring may be given about three weeks after the second; but unless in a favourable season very late manuring of wheat is not to be recommended.

In those districts of Britain having a rainfall of not over 26 inches nitrate of soda may in general be applied from the middle of March to the beginning of April, but where the rainfall is over 26 inches and up to 36 inches or over, no manuring with nitrate of soda should be made till the beginning of April, which may be as early for these districts as the beginning of March would be for the driest localities.

If the soil is gorged with water, or heavy rains fall soon after nitrate of soda has been applied, or the drains are discharging much over the normal quantity of water, a large proportion of the nitrate of soda so used will be carried by the downward movement of the water to the subsoil or drains. At first sight, it would look like as if what went to the subsoil would be a gain instead of a loss, but such does not appear to be the case. If the nitrate of soda which was carried down by the water remained there, it would be the best place possible for it, for then it would remain as a store on which all deep-rooted plants could draw, thus carrying them on in full health until maturity arrived. Analysis

of the subsoil of land which has been continuously and heavily manured with more nitrate of soda than was ever extracted from it, either in the crops or the drainage, show that it is not near so rich in nitric acid as one would be apt to suppose, and the conclusion has been come to that, by some means or other yet unknown, nitric acid apparently becomes split up into its two component parts, viz., nitrogen and oxygen gases, when both are useless as plant food. At Rothamsted, Sir John B. Lawes has had analysis made of a very large number of his experimental plots, and a study of them bear out the opinion here expressed. These analyses have been carried in some cases to a very great depth, in sections of about 9 inches so that the heavy manurings where not accounted for in the extra richness of the subsoil, drainage waters, or what is removed by cropping, leave only the one alternative of a return to the gaseous state. All that has been removed in the crops and drainage waters is accurately estimated and recorded each year, and what the total soil contains can be pretty nearly calculated, so that there is little or no doubt on the point.

At Rothamsted, where the drainage waters from differently manured plots is regularly collected and analysed, it has been found that if large manurings of nitrate of soda are applied while the drains are running freely, the drainage waters will contain a very large increase of nitric acid, within a few days of the nitrate of soda being applied. These plots consist of two half ridges of considerable length, both sides sloping to the centre, along the whole length of which is an ordinary field drain. The mouth of each drain is open, and provision is made for collecting and analysing a portion of the drainage from each plot, so that the time the nitric acid takes to travel from the surface to the drain can be pretty fairly estimated, from a study of the dates of manuring and the analysis of these drainage waters.

In spring or early summer when manuring with nitrate of soda in the British Isles, always choose dry weather for applying it, as there is at this season (in fact I might say at almost any part of the year) in the greater part of Brita'n as much moisture in the soil and air as dissolve it, and the slower it is dissolved the more economical will be the manuring, and the sounder will the growth of the plant be. The bad effects of mildew, rust, and soft straw, causing lodging, are, in the main, due to an over-abundant supply of nitric acid, which may have been applied or naturally formed in the soil during a warm, moist period. A plant so placed appears to get its supply of nitrogen too easily, and as it were without exertion, and in proportionately larger quantity than it can or has time to gather up the mineral ingredients required to build up a healthy stiff straw, the consequence is, the crop is in many cases the reverse of healthy, and falls a prey to all the ills to which that particular class of crops is heir to.

It is a common belief among farmers that nitrate of soda should only be sown immediately before or during rain, or as soon after it as possible, on the belief that unless washed into the soil it will evaporate. Nothing could be farther from the truth, the facts of the case being that we have few substances more soluble than nitrate of soda, and in the British Isles in spring applied to the driest of soils it will dissolve in good time, and under no circumstances is there any fear of evaporation, whereas applied during rain there is danger of serious loss by drainage. Again, the smallest quantity of nitrate of soda dropped on a damp leaf will almost invariably burn it, unless there be as much rain as will immediately wash it off, which is rarely likely to happen, as it is scarcely possible to sow it during rain, and, for the reasons already stated, it is not desirable.

The foregoing remarks apply principally to wheat grown in Ireland, the west, and north of England and Scotland. The south and east coast of England, a narrow strip along the east coast of Scotland, and the whole of northern Continental Europe, approach nearer each other in their spring and summer rainfall, and may therefore be treated more alike. Under such circumstances, one or at most two manurings will be enough, which may be applied earlier, and in considerably hea'ier quantities than in the other districts mentioned, without much danger of loss.

In no country, and under no circumstances of ordinary cultivation, should nitrate of soda be applied to wheat in the autumn, as the autumn and the winter rains will be sure to wash a greater or less portion of it, according to the climate, out of the soil. Even on comparatively poor land there is not the same necessity for applying nitrate of soda at that season, as, later on, the demands of the plant being then very insignificant, and, besides, at no time in all the year is land so naturally rich in nitric acid as in autumn, as was previously explained when treating of the nitrifying organism. Wheat, or for that matter of it, any plant which is grown on comparatively poor land, as a rule, stands the winter better than similar plants on very rich soil, provided the plants are allowed to get sufficiently strong before winter sets in. Wheat should therefore be sown as early as circumstances will permit, nitrogenous manure being withheld till spring, so that a short, stubby plant may be allowed to get up before frost comes on. Under ordinary conditions on land in anything like condition, more especially friable land, early sown autumn wheat is if anything likely to have an over supply of nitric acid, as nitrification at that time proceeds under very favourable circumstances. From the beginning of August to the end of September the supply of nitric acid in most soils is very great, and on those devoted to wheat growing, generally in excess of the requirements of the crop, as by that time the wheat plant draws little or no nutriment from the soil, the whole of its energies being devoted to transferring the matter contained in the roots, stalk, and leaves of the plant to the grain. It therefore happens that we have the largest stock of nitric acid in the soil at the very time the wheat plant least requires it. This stock being so liable to be lost by drainage, owing to its solubility will undoubtedly be washed away if a growing plant is not at hand to take it up as produced. Unless on weedy land, it seldom follows that a growing plant is at hand, so in this case at least, woods serve an important part in conserving an amount of nitric acid which would otherwise be undoubtedly lost. In no class of cropping is this more clearly shown than where an early crop of potatoes, turnips, vetches, &c., are removed, and the ground allowed to lie bare for a considerable time before a crop of wheat is sown, heavy rains falling in the interval or before the wheat plant has developed roots enough to take up the nitric acid as produced. In few cases will wheat grown under such circumstances do well, and the later it is sown the lighter the land, and the wetter the season, the worse will the crop be. The reason is, that sandy or porous soil has little or no power of retaining nitric acid, and no crop being at hand to take it up as formed, any rain which falls speedily passes through the porous soil, carrying any nitric acid it contains in solution with it. An examination of the discharges of the drains form the different manured plots at Rothamsted very clearly brings this out. It will there be found that the first discharges of the drains, after a period of dry weather, are always heavily charged with nitric acid, and that as the season progresses from autumn into winter the proportion will always get less and less until the normal winter quantity has been reached. It is principally in grain cultivation that this loss is apt to happen, and in order to lessen it as much as possible, I have for several years been in the habit of sowing all grain crops with cheap grass seed, so as to have a growing plant ready to take up the nitric acid as formed after these plants have finished blooming. The seed I have found most useful for this purpose is cheap samples of perennial or Italian-rye-grass, and in seasons when these grasses were made into hay were allowed from any reason whatever to approach too near maturity before being cut, there are always a considerble portion of seed which can be collected from the hay sheds and stable lofts, which, when carefully preserved and dressed, shows a fair per centage of growth. In many seasons little or none can be so collected, while, in others more than sufficient for two years may be obtained, and, as it keeps well there is no difficulty in preserving it from one year to another. It, of course, never has a high germinating power, but for the purpose intended thick seeding is not a necessity. All grain crops not intended for a hay crop the year following are sown with this bought or home saved seed from one to two bushels being used per acre, according to its germinating power. As a rule, a fair braid of grass is obtained which generally affords more sheep or cattle food after the grain crop is carried than several times pays for the dressing and sowing of the seed, besides leaving the land in good condition when ploughed down. The system has most effectually served the end intended, and deserves to be more widely known and practised. Any excess of nitric acid from natural formation or from applied nitrate of soda or other nitrogenous manures is at once taken up by the grass plants, whose growth in a favourable autumn is very rapid, loss by drainage being reduced to a minimum. In a wet autumn, land so seeded is much more open and drier than similar land unsown. When such land is ploughed during winter or early spring, the grass plants soon decompose and yield up the substance of their roots and unconsumed stems as food for the following crop.—*North British Agriculturist.*

IMITATION COMMODITIES.

In France a stringent law against sham butter has just been promulgated. A heavy, fine, with from six days to six months imprisonment may be inflicted for selling it as true butter. It is specially worth noticing that the use of the name butterine is absolutely prohibited. Any substitute for butter must be labelled as margarine, oleomargarine, or *graisse alimentaire.* So much for the views of French legislators on this imitation name for an imitation commodity.

The grounds on which the Secretary of the "Butterine Defence Association" pleads for the retention of this name in England cannot be regarded as conclusive. They amount in fact, to a begging of the whole question. It is urged:—(1) That the name of "butterine" has been known for many years; (2) that it may be found in standard dictionaries, and (3) that it is actually employed in the official publication of the Board of Trade. To this the very obvious replies are:—(1) That it is the experience of the 'many years" during which butterine has been so called, which supplies the reasons for a change of name; (2) dictionaries, when they are elastic enough to admit them, do not determine the moral expediency of "trade" or technical terms, but simply record their use; (3) every speaker and writer about butterine must of necessity employ that name until it is authoritatively superseded.

The matter can only be wisely settled by the enactment and enforcement of a rule applicable to imitation commodities of all kinds. This rule should be based on the principle, that no part of the name of any article shall be applied in the naming of any other substance made to imitate it, or which is intended to be used in a similar way. One of the reasons for such a rule was suggested in the *St. James's Gazette* a year ago, and it was this: That, by putting an imitative commodity on the market under a name which veils or shades off the fact of the imitation, instead of contrasting it with the generic term, a way is kept open for the practice of fraud. The history of butterine fully proves the justice of this proposition; which may be thus re-stated:—Suppose A. to represent a well-known article of daily use. An inventive genius discovers a likely

method of largely superseding it by a substance of very similar appearance, and which can be applied to the purposes of the genuine article. This he calls by the name of "A-1." Why? The reason is plain The name of the succedaneum suggests—however erroneously—but one remove from the original commodity that it leans upon, and from which it unlawfully borrows a misleading gloss. The manufacturer—however innocently—makes it profitable for himself by making fraud easy to the retailer. It gives, in a word, their "cue" to all tradesmen who are impatiently dissatisfied with the present rate of profit.

But if the rule suggested were in force, the maker would be compelled to deal in his imitative commodity under the title of "B," though for that matter, all the other letters of the alphabet are at his disposal The name of the imitation article should be "contrastive and not assimilative" with the article imitated. In fact, the greater the similarity between the articles the greater should be the contrast between their names

A further illustration of these remarks is furnished by the recent considerable "transaction" in "polvrette." It would have obviously damaged its chance of success to offer ground olive stones on their nominal merits as a suitable material for the adulteration of pepper. Under the name of "polvrette," however (the "A-1" of our argument), hundreds of traders found how conscionsably they could apply the adulterant to the fraudulent purpose for which it was intended. The warmest advocates of "butterine" agree that the selling of it as butter should be punished; but they will not allow themselves to see that, as long as the name of butterine is retained, its sale as "butter" is greatly facilitated and encouraged. If butter were a patented commodity, it is quite likely that its proprietor could obtain a perpetual injunction against the use of the word "butterine," as applied to an article so closely resembling it, and which is used for identical purposes. The interests of the public are at least as worthy of consideration as those of an individual proprietor.—*St. James's Gazette.*

A BOOK ABOUT TEA.

MR. JOSEPH M. WALSH, a prominent Philadelphia grocer, and, no doubt, "one of the most remarkable men in the country," has found that his customers are in the habit of asking to be told "all about tea," and to satisfy their curiosity he has published a little book entitled 'A Cup of Tea." He frankly pastes his business card over the title of his books, and devotes the last page to a similar announcement. As a work on tea planting the book is valueless, for whatever information is given under this head is taken from former works; but the position of Indian tea in the United States, and the possibility of establishing tea cultivation there are subjects of importance to growers in the East. It is sometimes stated by writers who are unacquainted with the real facts of the case that the purer and more cleanly manufactured Indian and Ceylon teas are gradually growing in favour, and ousting the Chinese article from the world's markets, and that every pound grown in this country is a blow struck at the Chinese producer. This, if Mr. Walsh is to be believed, is not the case. Indian tea production has grown from nothing to 50 million pounds per annum in forty years, but the Chinese production is said to have increased from 135 to 270 million pounds in the last twenty years, and even Japan is still 15 million pounds ahead of India. The world's yearly consumption is put down by Mr. Walsh at 400 million pounds

Indian tea was practically unknown in America until within the last few years; and this, perhaps, accounts for its being one of the few articles on the free list of the American Custom House. An ingeneous 10 per-cent differential duty is nevertheless levied on all teas imported from places west of the Cape of Good Hope, if grown east of it. This is probably directed only against British shipping; but since nearly all Indian tea goes to London, the regulation has checked its use in the States. The Indian tea planter—and still more the Ceylon one—proudly convinced that he produces an article that has only to be known to be appreciated to the exclusion of all other kinds, will be greatly shocked by the chapter on "blending." This, Mr. Walsh maintains, is a fine art, and not to be confounded with sugar-sanding and treacle watering practices. In the favourite American blends, Indian teas hardly ever appear, and they are said to be too strong to drink alone. Even when a pound is introduced into 20 lbs. of Chinese mixture, it is composed of four or five varieties, say Assam, Cachar, Darjeeling, and Kangra Valley, in quarter pound samples. Of course as long as this is sold as "Joseph M. Walsh's Particular" there is no objection to be made; what Indian planters are annoyed at is seeing this mixture put up in neat packets, with a picture of a Madras butler watering a tea bush, and labelled "Best Himalayan," or "High-Grown Ceylon." However, in the present state of the public taste, it seems impossible for American dealers to sell pure Indian tea, and they look upon any proposal to do so as chimerical Of course there are plently of people ready to open agencies all over the States, and to undertake to sell only the pure article, but even crediting them with the best intentions, it is doubtful if they could do much. The plain fact is that no retail demand for Indian tea exists; it is bought for "blending" by wholesale dealers, who thereby give flavour to their favourite Japan teas, and that is all that is wanted. Indeed, even in England, it is little better, as those who have sent tea to their friends know.

In the chapter which treats of the possibility of growing tea in the United States, the author says that tea culture is carried on experimentally on several farms, mostly in South Carolina. If the labour difficulty could be overcome, there is no reason why the industry should not be established. It is suggested that the United States Government might open small garden in a suitable locality, and work it for a few years. Nothing is, however, likely to be done in this direction. The American workman does not take kindly to cheap labour, and without it tea cannot be cultivated at a profit. A chapter is devoted to an account of adulteration, and the means of detecting it. We are not told how they adulterate tea in the States, but the practices of the Chinese leave little to be desired in the way of rascality. The chief substances used are Prussian blue, gypsum indigo, turmeric, China clay (kaolin,) sulphate of lime, willow ash, and plum leaves, si'ica and iron, and steel filings. The tricks of the trade can be detected chemically, but it requires an analyst to do so; one simple rule is, not to buy tea if the colour comes off on your hand, and that is about the only test that the average purchaser can apply.—*Madras Mail.*

BEWARE OF THE HESSIAN FLY

I.

SIR,—With your permission, I would gladly add a few words to your timely and valuable paper, entitled 'Beware of the Hessian Fly,' given in your number of Feb. 16.

You say quite correctly that on the appearance of the attack, I identified it as being of the Hessian fly, scientifically *Cecidomyia destructor*; and that I further proved it by rearing the fly from the chrysalis,commonly known from its peculiar shape as the 'flax seed.' But in an attack of this enormous importance, nothing was further from my wish than that the whole responsibility of identification should rest on my single statement, and I therefore submitted the 'flax seeds' on the corn stems to Professor J O. Westwood, Life President of the Entomological Society, whom I knew to be personally acquainted with the subject,and to Professor W. Saunders, late President of the Entomological Society of Ontario, and now Director of the Experimental Farm Stations of the Dominion of Canada—than whom we could have no better opinion from his perfect knowledge of the insect. In both cases I received unqualified and perfectly certain confirmation of the specimens being as I had determined them, namely, as chrysalids,or flax seeds of the Hessian fly.

Since then, whether from authorities of world-wide reputation, to whom I have submitted 'fly' or 'flax seeds,' or from scientific friends who have examined them here, there has been unfortunately no doubt ever expressed that it is this fearful scourge which is in the country,and which I am thankful that you are giving powerful aid in drawing attention to.

At present one most important point in preventing future attack, is to destroy all the fine siftings of small weed seeds,dirt,and rubbish, which fall immediately beneath the thrashing machines,in which the 'flax seeds' also fall. We are repeatedly finding that where straw is infested the operation of thrashing breaks or bruises it at the injured part, so that a good portion of the flax seeds fall down, and are to be found in the fine siftings These may be destroyed with no loss and little trouble, and by treating the infested straw in which some chrysalids are sure to remain in the various ways which have been already specified so that insect life may be destroyed by fermentation before the manure is carried to the field, a great deal of multiplication of this scourge will be checked

Further it is a great means of preventing loss to any great extent in case of attack on wheat, to sow strong-stemmed kinds. Where the stem is so strong and firm that firstly the fly maggot does not make much way in injuring it, and secondly, whether from the nature of the wheat, or being so well and healthily grown,that it does not elbow down for slight injury, much damage is saved.

This is well-known in Hessian fly infested countries, and I have recently had example of it from the Carse of Gowrie, whence I have had information of small damage (in some cases) accompanying attack; and the samples of infested straw which have been sent me have been stout and strong, not the elbowed down.

It would be a highly desirable means of prevention if every farmer who purchases imported barley or wheat straw for fodder, or litter would examine whether the brown flax seed like chrysalids are on it, especially near the lower joints. This would be very easily done by opening out the tightly-sheathing leaf and seeing if the little brown flax seeds are inside.

Slightly used litter, such as I see a good deal of, here, is also to be suspected, and long manure.

But there is one point in which I should be glad to correct a slight misapprehension of my meaning. I believe it to be quite impossible that the flax seeds can be conveyed in most litter for the following reason:—The maggots turn to chrysalids on the corn stems where they fed, so that unless siftings or screenings infested with the pest have been thrown on the litter, I do not think they could be present. Should any of your correspondents desire copies of my pamphlet, *The Hessian Fly in Great Britain*, with figures in all stages, it would be a pleasure to me to forward gratuitously to any applicant.—I am &c., ELEANOR A. ORMEROD.

Dunster Lodge, Spring Grove, Isleworth.

II.

THE unwelcome discovery of the Hessian fly in some parts of Scotland—*i.e.*, in the counties of Perth and Inverness—last autumn aroused some interest not to say alarm, amongst farmers at the time, but comparatively little has since been heard of it on this side of the border. The alarm, however, had only just subsided, when a Perthshire farmer had unfortunately to break silence on the subject. Mr. D. Taylor, Dalsally Farm, Errol, has lately called attention to the discovery, amongst wheat straw, of a flax-seed shaped brown coloured chrysalis, which Miss Ormerod, the well-known consulting entomologist of the Royal Society of England, identifies as that of the Hessian fly.

Were we not cognisant of the fact that Miss Ormerod has given much attention to the subject since the fly first apppeared in England, and from the *pupæ* sent her last September actually succeeded in hatching a fly which entomologists on both sides of the Altantic have identified as the dreaded depredator we should have been unwilling to believe that the pernicious insect had actually obtained a footing in this country. That it has appeared in England at least, is beyond doubt, and we are apprehensive of its veritable existence in Scotland. The flax-seed or oval shaped chrysalis has been repeatedly shown to Miss Ormerod, and that enthusiastic lady-entomologist, we believe, subjected some of the specimens to thorough test. She encased them, and supplying them with as nearly as possible their natural habitat succeeded, as already indicated, in developing the live insect. This has given her an opportunity of studying the pupa and becoming familiar with both its appearance and habits

The novel pest has been seen by more observers than Mr. Taylor. Several of his neighbours have observed similar symptoms, and he himself found enough to convince him that his crop was more or less infested. On wheat grown on black soil after potatoes, the pupæ were plentiful; on wheat produced by clay no symptoms could be found. But he has found it 'in barley grown both on light and heavy soils, and pretty thick among mustard and other small seeds which fall through the sieve of the fanners below the thrashing mill.' In the affected straw the pupa was lodged close to the lower joint, and snugly embedded in the stalk. Its detection is not always easy, but so peculiar and destructive are its habits of life that any one, upon close examination, might ascertain whether it existed or not. The fact that it invariably conceals itself immediately above the joint is a guide to its whereabouts and its ravages soon impair the health of the affected plant.

Our main purpose in the meantime is to warn farmers to fortify themselves, as far as possible, against the spread of what has proved a terrible scourge in other parts of the globe. Both South and North America have suffered severely from the incursions of the Hessian fly. They have occasionally had to abandon wheat growing on this account, and its ravages on other crops were grievously destructive. During the last American outbreak a well-informed writer declared that—'Were it to reach Great Britain it would be the greatest scourge that island ever experienced as it multiplies from heat and moisture, and the most intense frosts have no effect on the egg or the aurelia. Were a single straw containing the insect egg or aurelia to be carried and safely deposited in the centre of Norfolk in England, it would multiply in a few years so as to destroy all the wheat and barley crops of the whole kingdom.'

Mr. Taylor, in a series of letters to the public prints, suggested that farmers should co operate with a view of combatting the pest This is, we think the best precau .n that could be taken. Let each farmer examine minutely the straw in his own barn: and exercise the utmost care and vigilance in importing straw or moss litter Some people have tried to discredit the belief that the insec could be conveyed in moss litter; but we think with Miss Ormot rod that such is not improbable. Where the pupa is suspected, immediate action towards its suppression should be initiated.

It has been recommended by Professor Wallace, as a preventive for the pest, to—(1) Eat the affected crop close by sheep, and then top dress it with soot, lime, or guano; (2) to cut the crop above the second joint; (3) to scarify the land and burn the stubbles; (4) to allow grain to germinate, and thus produce plants for the insects to deposit their eggs upon, and then eat it by sheep or plough it down; (5) to plough deeply, or roll with Cambridge roller; (6) affected straw may be used for litter, but the dung must be treated so that the chrysalis should not be allowed to develop—the heap should be covered over for a time until it ferments or it may otherwise be covered with gas lime; (7) to avoid using infested corn as seed, clean out chaff and burn it immediately; (8) never follow infested crop with a grain crop, and (9) beware of imported straw or grain.

In conclusion, we would strongly urge all those interested to watch carefully in two directions. Firstly, to examine carefully all imported straw as suggested, either brought directly from abroad or indirectly as town manure, and should any appearance of the fly be found, to trace immediately the source from whence the straw was imported. Any clear evidence as to the country whence the straw was originally sent would enable us to get Government legislation at once to prohibit any further imports from the infected country. Secondly, as the cereal crops begin to attain length of straw about May, to watch the plants vigilantly for any giving way of the stems above the second joint from the root, where the maggot and chrysalis are to be found, and promptly to use such methods as are proposed by experts for the stamping out of the unwelcome visitor.—*North British Agriculturist.*

THE PLAGUE OF RABBITS IN AUSTRALIA.

Of all the plagues of Australian farmers the rabbit is certainly the worst. So great have been his ravages that whole districts in Victoria have been threatened with ruin. To keep the pest under control the Victorian Government has spent, since 1883 no less than £90,000, and even now there are districts in Victoria where the mischievous rodent can be seen gamboling in thousands at all hours of the day and night. The first rabbits were introduced into Victoria in 1859 by Mr. Austin, of Austin Park, near Geelong. They were four in number, and were set free in a rich pastoral paddock to do as they pleased. They soon formed such a splendid colony that Mr Austin congratulated himself upon being a public benefactor. In 1863 the first instance of rabbit poaching was detected. Great was the indignation of the people, and of Mr. Austin in particular. The unfortunate youth who had been guilty of this heinous crime was dragged before the Magistrates, and though no game laws existed in Victoria, was fined heavily for being "illegally on the premises," despite his pleading that he was a servant of Mr. Austin and had good reason to be in the grounds of the park. If that youth were now known to the farmers in the rabbit-infested districts they would be very likely to return him at the head of the poll as a member of Parliament. Bunny after this lived in great security until 1865, when the Duke of Edinburgh visited Victoria. The "Squatters" vied with each other in their efforts to afford the Royal visitor a splendid welcome, and the idea occurred to Mr. Austin that a rabbit *battue* would afford capital sport to his Royal Highness and suite. The unsuspecting bunny was accordingly attacked right royally by gun and dog, man and stick No less than 40,000 rabbits fell that day. Farmers and every one in the district joined in the sport and ate rabbits for a week afterwards.

This was too much for bunny. Naturally of a retiring disposition, and fearing a repetition of royal visits, he gradually disappeared to the stony rises of Camperdown and the banks of the two beautiful lakes in Colac. Here he waged war with the squatter, and in a little time became absolute master. The luxuriant growth of grass in the neighbourhoods quite suited him. What grass he left the cattle and sheep refused to eat, as the smell left by rabbit is offensive to them. More than one squatter in the vicinity of the stony rises had to practically abandon his "runs" Others spent large sums of money to destroy the pest, but the cost of exterminating bunny soon became too great for any farmer to bear. At last a brilliant idea struck one of their number, Rabbits were luxuries in England; why not start a factory for preserving them, and send them to the old country for sale A limited liability company was soon formed, and a rabbit factory was started in Colac. Of course nothing could be done except in winter and spring as the heat would not permit of successful canning during summer. While the factory was in full swing it bought 80,000 pairs. and some times 100,000 pairs per week. Trappers made £5, £6, and even £7 per week at their work. The flesh of the rabbits was canned and their skins were sent to England where they were utilized in the manufacture of silk hats. By this means and with the help of private trappers for the squatters, the plague was, to some extent, kept down. But the rabbits soon emigrated to fresh pastures, and at last reached the grain districts of Victoria. It was here that their presence was most felt. Fields ripe with wheat were demolished in a couple of nights Farmers and their assistants could be seen all night with lamps, sticks and dogs fighting against the plague. But it was of no avail The rabbits came in swarms, and many hundreds of selecters of land were eaten out of house and home The various Shire Councils offered rewards for every rabbit scalp, and something like £100,000 was spent within a few years in this way. The Government sent out parties of men to distribute phosphorised oats in the infected distrcts, and thus many millions were destroyed. But in spite of all, the rabbits, did not seem to decrease and selections had to be abandoned wholesale. Then the Victorian Legislature passed a "Rabbit Act," making it penal for any farmer or squatter to fail to help the Government and the Municipalities to exterminate bunny. Another clause in the act gave Justices the power of inflicting a fine of not less than £100 on every person who was found in possession of a caged rabbit. Every effort was used to keep down the plague. Squatters even imported mongooses from India, at a cost of Rs. 25 to Rs. 30 each.

They however, proved a failure. They soon got tired of rabits, and turned their attention to farmer's hen roosts—or amused themselves by destroying snakes Rabbit proof wire fences were now erected round each selection at great cost, and rappers were kept harder at work than ever. Bunny began to despise the phosphorized oats and then the experiment was tried of killing him in his burrows by the aid of strong acid fumes and burning sulphur. A party of men would set out with dogs to scour the hedges. The bunnies would run to their burrows and then the work of wholesale destruction would begin. All the entrances to the burrow except two, having been closed, burning sulphur would be introduced at one aperture, and the fumes of some strong acid at the other. The rabbits at the sulphur end of the burrow would hurry to the other only to be suffocated by the fumes of the acid. This proved to be an effectual way of destroying them. One district (Charlton), which was till very recently in danger of absolute ruin, has now but few rabbits left. The plague is steadily abating, and there is every prospect of the farmers being able to keep it in subjection. In some districts, however the little hillocks of stones supply bunny with an impregnable citadel These places will have to remain as the supply

grounds for the canning factories. The fecundity of the rabbit may be judged from the fact that the descendants of one pair will in two years number three millions. In the Swan Hill shire alone, no less than two million rabbits were on an averge destroyed every month. By the plan of introducing noxious fumes into the burrows, something like four millions a week were got rid of. Even hares in Australia breed quicker than in any other part of the world. There used to be a close season for these creatures, but owing to the alarming rapidity with which they have increased the restrictions have been removed, and efforts are being made to keep them down. Every English pest introduced into the colonies has proved ruinous. An enthusiastic Scotchman introduced the thistle, and now has the curses of the farmers in Ballara and Gippsland. An English gentleman set two sparrows at liberty, and now farmers pay boys a penny and two-pence for every nest of that bird's eggs they destroy. Mr. Chirnside, a wealthy squatter, imported a number of foxes for the sake of sport, and now they are a terror to lambs and hen-roosts all over the country. What would have been the result had jackals been introduced, as was proposed, it is hard to say, but the colony was spared this infliction.—*Englishman.*

HINTS TO HEALTH.

A few weeks since a young mother showed us her infant, about a year old, and complained that the babe was not perfectly well, and yet not really ill. The little one was fat, but its face was pale, and the flesh was flabby. This appearance is quite commonly met with among children artificially nursed. It is well known among physicians that infants fed with artificial foods are liable to have rickets, and that this plumpness referred to is often delusive. Upon inquiry it was ascertained that the infant had been nurtured all along on an artificial food. We inquired into the condition of its bowels and the mother replied, lightly, "Oh, my baby's bowels are a little loose, but I don't mind that : I would rather they would be loose than the other way." Hundreds of mothers think the same, and yet if they followed the infant mortality from diarrhœal affections from week to week there are few things that would alarm them more than for their little ones to have "looseness of the bowels." One of the first evidences that a child is not being properly fed is a slight diarrhœa, and there is not in the entire list of infant diseases one symptom more deserving of apprehension than this.

In the case above recorded the child's diet was changed but little, and yet to-day it looks entirely different. If there is one thing more than another that infant foods are deficient in it is fat, and yet whenever rapid cell growth is taking place, fat is requisite. Fat is an absolutely indispensable aliment of the young, and to deprive them of it may entail life-long consequences. Bearing these facts in mind, we recommended some cod liver oil dissolved in Malt Extract, and a Solution of Cod Liver Oil operated like a charm. It was just what the child wanted, and was recommended to be administered on the tip of the little finger, allowing the infant to suck it off. While in Brighton at the British Medical Association, the father met me and said he had a letter from home. He took it from his pocket and read me the following which his wife had written :—"Tell the doctor that the baby was never so well in her life ; I can see a change in her every day : she crows with delight when I am going to give her the Kepler Solution of Oil in Malt, and when I take it away she actually cries for it."

By supplying what the system was in need of this corrected all difficulties itself. It would have been a mistake to have given this little one paregoric astringents, &c. An infant under such circumstances should never be given opium in any form. It should be judiciously fed on a tolerably uniform diet from day to day and the diet should be mainly milk peptonized with Peptonizing Powders. Those who are rearing infants on artificial foods will do well to give them a few sips of the Kepler Solution of Cod Liver Oil in Malt on the tip of the little finger three times a day. It may save them from a multitude of troubles.—*The Doctor.*

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 14TH APRIL, 1887.]

Madras.—General prospects fair.

Bombay.—Rain in parts of Poona, Sholapur, Dharwar, Ratnagiri Bijapore, and Belgaum. Harvest operations still going on in some districts. Fever in parts of nine, cattle-disease in parts of ten, small-pox in parts of four, and cholera in parts of three districts.

Bengal.—Some rain in most districts. Ploughings and sowings in full progress. Indigo and sugarcane doing well, *Rabi* crops mostly gathered, with good outturn. *Boro* rice harvest has begun. *Mahua* crops moderate in Chota Nagpore, but plentiful in Sonthal pergunnahs. Public health generally fair.

N.-W. P. and Oudh.—Harvesting of *rabi* nearly completed. Rain has fallen in most districts. Supplies sufficient and prices steady. Cholera and small pox still continue to be reported from a few districts; otherwise health is good.

Punjab.—Slight rain has fallen in the Delhi and Umballa districts. Health good. Prices rising in the Rawalpindi, Dera Ismail Khan, and Peshawar districts; elsewhere high but stationary. Expected *rabi* yield below average.

Central Provinces.—Cloudy weather has continued throughout the week, and rain has fallen in places. In the Bilaspore district a considerable fall of rain has occurred, which has enabled the people to push on ploughing for the *kharif*. Season prospects unchanged.

Burmah.—Slight increase of cholera in Moulmein, one case each in Rangoon and Thayetmayo, a few cases in Akyab and Pegu; otherwise public health of Lower Burma good. Slight cattle-disease in four districts. Reports received from six districts of Upper Burmah. Public health good. Food-supplies scarce in Shwebo, and prices high. Prices rising in Pyinmana, elsewhere supplies sufficient, and prices normal. Agricultural operations and prospects satisfactory.

Assam.—Weather seasonable. Rain has been general. Sowing of *ahu* paddy and *dumahi* crops still in progress. State of prospects favourable. Tea-plucking and manufacture commenced in Dibrugarh. Cattle-disease prevalent in Karimganj, sub-division of Sylhet. 9 deaths from cholera from Katigara, 4 from Silchar, and 1 from Lakhimpore reported. Public health good otherwise. Prices steady.

Mysore and Coorg.—Slight rain reported in parts. Standing crops in good condition. Prospects of season favourable. Water supply and pasturage are diminishing in parts of the Kadur district. Public health good. Cattle-disease and small pox prevalent in parts. Prices slightly risen in the Chittaldroog district and fallen in Bangalore, Tumkur, and Hassan districts. Coffee plants have blossomed very generally in Mercara.

Berar and Hyderabad.—Weather cloudy and warm. Threshing of *rabi* almost completed. Ploughing for *kharif* in progress. Fever, small-pox and cattle-disease in parts of Akola; cholera still, prevalent in Hyderabad and Suburbs. Elsewhere public health good. Prices steady.

Central India States.—Weather cloudy and hot. Crops fair. Average outturn of opium in Agar 12 annas in the rupee. Opium gathered in Bhopawar. Cholera decreasing in Morar. Elsewhere public health good. Prices stationary.

Rajpootana.—Weather seasonable. Slight showers in places. Tanks and wells diminishing generally, Crops being harvested. Threshing continues *Mahua* being gathered. Small pox and fever very prevalent generally. In other respects public health good everywhere. Prices fluctuating.

Nepal.—Much thunder during the last two days. Sky overcast and weather comparatively cool. Prospects fair.

Editorial Notes.

THE accounts relating to the opium revenue for the current year are curious. Up to date, for April, the revenue from the Bengal drug is Rs. 97,600 short of the estimates, while the March sales of Bombay exceeded the estimates by Rs. 2,03,325, showing a profit of Rs. 108,725 for two months of the year, and a gain of a little below 22½ lakhs for the first four months of 1887, over the estimates.

THE prospects of the Indigo crop in the Madras presidency were very satisfactory up to the end of February. The area under cultivation was 389,196 acres, against 267,044 acres in the previous year. The late sowing of the last autumn covered 95,102 acres, or an average of 24 per cent of the entire cultivation. The principal Indigo growing districts are Kistna, Nellore, Cuddapah, Kurnool, and South Arcot.

THE 'rabi' harvest in the Punjab seems to have been so unfavorable, that there is room for great uneasiness as to the prospects of the people. The failure appears to have been universal, and the period is past when any rain, however copious, could change the character of the harvest. The Government will no doubt see that proper steps are taken to ascertain the exact position of the people, and the help they are likely to require.

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A LOCAL contemporary has been at the pains of publishing a series of articles on Brick Tea, and the possibility of supplying Tibet with this article manufactured in India. We have ourselves advocated such a trade; but the difficulties in the way of accomplishing such a desirable end would appear to be very great, if we are to credit the statements made by a Darjeeling correspondent of another contemporary, whose letter will be found in another column.

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Two letters have appeared in our contemporaries, the *Pioneer* and the *Englishman*, in reply to Mr. Donald Smeaton's note on the wheat trade of India, from persons evidently connected with the trade. They both plead "not guilty" to the charge brought against the shippers of wheat at Bombay and Calcutta. So far as the letter of "a Calcutta Exporter," is concerned, the *Pioneer* has "hit off" the mark, and its criticism will be found elsewhere. The letter of "A Trader" is a rather rambling one, but we nevertheless reproduce it, as containing the views of the mercantile community upon this important question.

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THE Rev. JAMES DOYLE writes from Kilacheri as follows :—

"A monster lime, fully ripe, was taken off a tree in the Irish Mission farm, Madras, the other day, weighing 2¼ lbs. The fragrance of this single fruit was so powerful as to scent a whole house —an ordinary bungalow ! On cutting it open, I found the under-surface of the skin irregularly and abnormally developed, the pips almost devoid of juice, and a quantity of dark brown, transparent, and apparently viscid matter transfused in various directions, which on being compressed between the fingers, crumbled to a white powder, insoluble in water.

THE tobacco crop of Bengal during the past year is described as a very good one in the official returns. The total quantity

exported amounted to 117,700 maunds. This cannot be regarded as indicating a very brisk trade in this leaf, especially when it is remembered that the tobacco plant is indigenous to Bengal and Behar. The quantity exported must not, however, be taken as a basis in calculating the total cultviation and out-turn of the cured leaf, for a very large quantity is locally consumed, the Natives being heavy smokers. The principal tobacco growing district is Rungpore, in Northern Bengal, where it forms one of the chief articles of export trade. The Nuddea district also grows a superior kind of tobacco, known as the "Hingli," while in the Dooars its cultivation is now spreading.

PLEURO-PNEUMONIA has been spreading at an alarming rate in Scotland. The *North British Agriculturist* in a recent issue says: "During the last few months—since the middle of January, indeed—there has been a very serious spread of pleuro pneumonia throughout Scotland. Up till the end of 1886 there was not so much to complain of as regards the ravages of this most insidious and fatal complaint, though the country has not been completely clear of it for a considerable time. Not for many a day, however, with what are termed suppressive machinery in force in each county, have there been so many outbreaks as have occurred since last New Year. At the present moment, we believe there are nearly sixty infected herds and contaminated steadings or courtyards in Scotland with pleuro-pneumonia. That certainly gives cause for uneasiness; all the more so that the pest is widely spread over Scotland. The east Borders are tolerably clear, and so are the counties north of Banffshire; but the disease really threatens the rest of Scotland in a formidable fashion."

THE following letter has been addressed by the Assistant Director of the Royal Gardens, Kew, to the Under Secretary of State for India, regarding the more extensive utilization of the various species of cactus in the extraction of alcohol in India:—I am directed by Mr. Thiselton Dyer to draw attention to a paragraph in the report on the Government Botanical Gardens (Lal Bagh) dated 19th June 1886, which mentions that great tracts of cacti exist in Mysore (and probably also in other parts of India) which at present are useless for any purposes whatever. Possibly, as proposed by Dr. Bonavia, the country prickly pear of India can be utilised for the purpose of grafting on it good fruity varieties from Malta and elsewhere, but failing this the attention of persons in India might very well be directed to the subject of utilizing the fruits of different specess of Opuntia for the purpose of extracting Alcohol. This subject has lately been brought before the Foreign office in a Report by Mr. Consul Bidwell, of Malaga, dated July 9th, 1886, and it is fully described in a pamphlet "Memoria sobre a cultivo de los chumbos Y su empleo para la fabrication del alcohol: by D. Fernando de la Camara Malaga, 1886.

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 14th April, 1887:—Rain in varying quantities has fallen generally throughout Madras, Bengal, the North-Western Provinces and Oudh, and Assam. Slight showers have also occurred in parts of Bombay, the Central Provinces, Rajootana and Mysore and Coorg. The rainfall was general in Lower Burma during the week endig 2nd April. The *rabi* harvest is approaching completion in Bombay, Bengal, the North-Western Provinces and Oudh, Hyderabad, and Rajputana, and has been completed in the Central Provinces and Berar. The prospects of the harvest are, on the whole, favourable, except in the Punjab, where the yield is expected to be below the average. Operations for the *kharif* harvest have commenced in parts of Bambay and the Central Provinces. The standing crops are good in Madras, Mysore and Coorg, but rain is still wanted in some parts of Madras. In Bengal the spring rice harvest has begun, and cultivation for the autumn crops is in progress. In Assam the early rice sowings are still going on. Indigo and sugarcane promis well in Bengal, and sowings for these crops have also commenced in the North-Western Provinces and Oudh. The public health in all Provinces is generally good. Prices are rising in three districts of the Punjab, and flaling in three district of the Central Provinces. Elsewhere they are steady.

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THE *Pioneer* writes as follows regarding the report of the Committee on Mr. Roger's invention for compressing fodder:—In addition to the two Committees who examined the compressed fodder of Mr. Arther Rogers at Saharanpore, and whose reports we have already noticed, specimen bales of the fodder were examined at the Nauchandi Fair at Meerut by a number of military officers, among whom were Major-General Sir George Greaves and Lieutenant-Colonel Graham-Smith, and a copy of their report is now before us. The recorded opinion of these gentlemen is that there is nothing new in this method of compressing fodder, with the exception that bhusa has not hitherto been successfully compressed, that the plan proposed by Mr. Rogers of utilising certain mills as the machinery of compression is a good one; and that there is "no question as to the advisability of compressing fodder if it has to be carried with an army." Probably the fact that another method of compressing fodder has now been brought under notice of Government made the subscribers to this report obary of committing themselves. At any rate comparing their report with the more detailed ones given by the Committee, over which Colonel Ben Williams presided, they have hardly accorded so generous a recognition of the merits of Mr. Rogers method as they might have done. Instead of giving emphasis and prominence to the advantages of the Roger's patent, they state that the method has in it nothing new, and only admit its peculiar merit subsequently or by way of qualification. It is just because Mr. Rogers has succeeded in compressing bhusa, which had never previously been done, and because he requires no new plant or machinery, that his method has distinct originality and carries advantages in its train which it is difficult to see can be secured otherwise. By compressing bhusa Mr. Rogers has solved the problem of compressing the one fodder most plentiful and easily procurable in India; and by requiring for the purpose only existing cotton-presses he can do this at a cost so small as to be impracticable in the case of any method necessitating the importation of machinery from England.

OUR contemporary goes on to say that "on this point there cannot be the shadow of a doubt. We can state as a fact that West's Patent Press Company, Limited, which owns hydraulic presses of the sort used by Mr. Rogers, at all principal stations in Northern India, have offered to compress fodder on Mr. Rogers' system at the rate of 12 annas a maund, provided the fodder be supplied by Government. These presses lie idle at present except from October to March, but the Company are willing to let the Government have the use of them even during these months should the opportnuity occur. There are twelve stations where these presses are available, and Mr. Rogers claims to be able to turn out from them two lakhs of bales of compressed fodder per month. Now, suppose machinery had to be imported from England and set down at every one of these stations, it is perfectly clear that the initial outlay would be enormous, and this would ultimately appear in the cost of the bales. If, on the other hand only one large factory were established, there would still be a arge outlay necessary on machinery; but besides this there are grave objections to having only one factory, or even a few of them. Cheap fodder like bhusa cannot stand any large item of carriage to any central factory, and, therefore, the larger the number of pressing centres the cheaper the fodder. A single factory, moreover, would be liable to vicissitudes of season. This year, for example, there is almost a famine scarcity of fodder in the Punjab, but by the utilisation of the presses in the North-West, where there is no scarcity, two lakhs of bales could be sent to the Punjab in a month. Lastly, a single factory would have the appearance of a monopoly, and the strain on it in time of war would be over-whelming. Of course there is the question whether the fodder produced under Mr. Rogers' system is as good as that produced under the other, and this is, no doubt, a point the Government will have to take into consideration; but in the meantime we can state that Sir Edward Buck, whose opinion is entitled to very great weight, has recorded his belief that Mr. Rogers fodder cannot be improved on. We have made these remarks out of no prejudice

against the rival system to that of Mr. Rogers ; but that system is known to have the support of the Home authorities, and on more than one occasion too much attention has been paid to such support in deciding a purely Indian question. We trust there will be nothing of the sort in the present instance." We entirely agree with our contemporary's views ; and cannot but condemn this systematic want of recognition by the Government of any thing Indian, no matter how valuable. It is in this way that local enterprise and inventive genius in India are checked and suppressed, instead of being recognised and encouraged. The disabilities of the Indian inventor will be further enhanced by the provisions of the new Inventions and Designs Act, now before the Supreme Legislative Council.

CONSIDERABLE excitement prevails amongst the opium merchants at Hong-Kong, in consequence of a Bill that has been brought into the local Council, to give effect to the agreement come to last year, by the joint Commission that was provided for by the Chefoo Convention sixteen years ago, but that was not appointed until last year. The Bill aims at the suppression of the smuggling that has notoriously prevailed in the conduct of this trade, The merchants complain that the officials show undue Chinese proclivities, and can " hardly be weaned from their narrow and circumscribed range of vision." On the other hand, the Hong-Kong *Daily Press* gives full support to the Bill, and believes that it will put an end to the just complaints of the Chinese authorities, while distinctly lessening the evils connected with the trade

" If the new Bill is accepted, we shall have a well-known tariff, and no exactions by under-lings, or if there be any at first, there will be a chance of these being promptly redressed. Owners too, will at all events have their opium in their own godowns, instead of in hulks, as might have been the case. They are simply asked to co-operate to prevent smuggling at some slight trouble to themselves. Singapore does this already for the sake of her own revenue, and it seems reasonable to suppose that Hongkong will do the same for her own revenue, to relieve her trade from restrictions, to please China, and to fulfil the pledges given by the British Government."

As to any fear that the opium trade may be driven elsewhere, it may safely be dismissed according to the *Daily Press.* Macao acts in concert with Hongkong, and therefore can secure no advantage over that colony, or offer a refuge to smugglers. The trade is hardly likely to go to Haiphong, where the duty on opium is $15 per ball. The drug cannot be landed at Saigon unless to the opium farmer ; and it certainly will not go to Manilla. The one peril, says the writer, that menaces the Indian opium, is the rivalry of the native drug. " But if the Chinese Government fail to increase the duty on home grown opium, and it interferes with the import of the foreign drug, their revenue will undergo a serious decline. This contingency has already been foreseen by the Viceroy of Chihli, and we believe the duty on the native drug, in spite of the reported opposition of the Marquis TSENG, will be very materially increased. The Pekin Government will not lightly surrender so large and certain a revenue, merely to profit the poppy cultivators of Yunnan, Kweichow, and Manchuria." It is certain that the Governmenment will no longer suffer the reproach of failing to carry out the provisions of the Chefoo Convention. Public opinion at home is too pronounced amongst men of all parties, to permit the evasion of the Convention any longer.

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THE cultivation of tobacco was first introduced into Sumatra in 1864, while its produce is growing in favour with Europe, on account of its large thin leaf with scarcely perceptible ribs, and its even colour. The leaf is now greatly in demand for cigar wrappers, at a comparatively moderate price. The total export value in 1884 was 27½ million florins, or about £2,500,000. The three chief producing districts are on the east coast of Sumatra, *viz*, Deli, Langkat, and Serdang. The average prices realised are, for—

Deli	florins	2·98	per kilo.
Langkat	„	2·84	do.
Serdang	„	2·44	do.

Planters have hitherto taken new ground nearly every year, leaving plantations fallow for five or six years to recuperate, but the increasing demand for land has led to the introduction of artificial manure, and the importing of guano. The cultivation of tobacco is found to be so profitable that the old plantations of pepper and nutmeg, which were formerly of considerable importance, are being abandoned for the growth of tobacco. There were about ninety plantations in the above-named three districts in 1885, and sixteen more were to be opened in 1886 The cultivation is being tried in the new provinces of Assahan and Tamiang, as the available ground in the Deli district is nearly all occupied. The plantations are chiefly owned by companies, but in some instances by private firms or individuals. For the opening of a plantation a capital of 15 to 25,000 dollars is necessary, the field work is done by Chinese labourers, imported from Penang.

One of the largest export firms in the trade, is Messrs. Kehding, Huttenbach & Co., and information from reliable sources declares that the profit in 1884 was in some instances, as high as 140 per cent. upon the capital employed. The district of Deli alone exported 80,000 kilos of leaf in 1885. The shipments mostly go, *via* Singapore, by steamer to Holland, but a portion of the Sumatra tobacco finds its way into Germany. Thus Bremen imported :—

In 1884	kilos	1,160,000	value	4,205,000	Marks.
„ 1885	„	1,346,047	„	5,489,999	„

If the new plantations prove successful in the provinces to be opened out, it is thought that the price of Deli tobacco may go lower, but in spite of an increasing production hitherto, prices have been well maintained and have even risen. We are indebted for these notes to *Kuhlow's Review,* and we cannot but think that tobacco should yet prove one of the great staples of India's exports.

WRITING of the Ghaut forests of the Nilghiris, an Ootacamund paper says :—

"There can be no doubt that *Castilloa elastica* would thrive in the lower Ghaut valleys. The climate, soil, and general surroundings of the forest in which the caoutchouc tree is indigenous, are exactly similar to that of the lower Ghaut range. The point, however, which nothing but experience on the spot can determine, is whether in this tract of teeming fertility and bewildering wealth of species, it can so far intrude on the closely fitting vegetative economy as to conquer an independent position in the forest flora. Most probably it would require some artificial aid to maintain itself. Only to a limited extent could we afford the latter, for the same poisonous climate exists in the tracts under discussion as in the trees' new-world habitat. The region is permanently inhabited by aboriginal tribes, who sometimes settle down into villages in healthy localities ; at other times retire to the most lonely and malarious portions of the belt where they seem to be dying out. They cannot be relied upon for general work, but abundant labour for a portion of the year may be procured. Villages with surplus labor exist on spurs of the Ghauts almost overhanging the low country, in a cool and non-malarious climate, two or three thousand feet above the sea. On such a spot the hut of the supervising officer could be erected and fever-stricken coolies located for change of air The whole forest region below is now pierced by easy Ghaut roads at intervals of about fifty miles and bridle-paths run up the accessible passes along which the produce of the hills is taken to the sea. In the lower Ghaut forests *Castilloa elastica* would find a habitat quite as suitable and unhealthy as its own in America, and with a little care and culture there is no doubt, it would yield at least twice the amount of rubber which it now produces in its normal state. Planters might do worse than turn their attention to this cultivation. In these tracts may be seen towering trees such as grow nowhere else between the two seas ; ebony slowly rotting ; cardamoms, gamboge, woodoil, cinnamon oil, resins, gums, &c., going to waste and untouched. True, it is difficult to work some parts of those belts ; to drag heavy timber, slides would have to be constructed or elephants employed. Though the latter exist in large numbers in an unregenerate state on the spot, yet in most of the acclivities, no elephant could work on a crumbling foot-hold dropping down at an angle of 40°. We fail to see, however, why a portion of the evergreen forests should not be put in working order. If money for forest purposes is to continue as scarce as it has been, it should in preference be spent where it will yield the quickest

returns, i.e., in a rational working of the Ghaut forests . . . Considering the inaccessibility and unhealthiness of the lower Ghaut forests, we have here a case of what is termed a 'providential adaptation of ways to means' in the fact that the locality is so well fitted to produce an article so necessary in the arts and of such a growing application as caoutchouc.

INDUSTRIAL STATISTICS OF INDIA.

ONE of the most important returns issued by the Government is that which contains the Industrial statistical tables for the whole of British India, showing the material progress and condition of the country. The latest return just received embraces the period from 1879-80 to 1885-86, and brings to light some very interesting facts. From the census statistics, based on the census of 1881, we gather that Oudh, Bengal and the N-W. Provinces are the most densely populated provinces in the Empire. The whole male population of the country is set down at nearly 130 million souls,of whom less than 12½ percent are returned as being engaged in commercial and industrial pursuits, while 40 per cent, or over 52 millions, were directly engaged in agriculture. To these might also probably be added the bulk of the labourers, and a large proportion of those returned as "independent and non-productive," both of which together comprise nearly 56½ millions, or slightly over 43 per cent. Out of a total of 714,707 towns and villages in India in 1881, as many as 348,466 contained less than 200 inhabitants each, while of towns, properly so called, the number is relatively very small, for an area of 13,72,588 square miles. There were only 63 towns with a population exceeding 50,000, and only 23 exceeding 100,000, of which five alone exceeded 200,000, viz,Bombay, Calcutta, Madras,Hyderabad,(Deccan,) including Secunderabad, and Lucknow. The increase in the population of these large towns in very noticeable, especially in a few cases like Rangoon, where it has been quite remarkable. It is noticeable that, while in 1871 there were only 45 towns, with a population exceeding 50,000, the number had increased to 63 in 1881.

Under the head of Forests, a very remarkable increase is noticeable, showing that these operations have been pushed on with great vigour during the last eleven years. At the end of 1885-86 the area of forests demarcated and reserved by the State was 49,474 square miles, as compared with 12,071 square miles in 1874-75. In 1878-79 it was raised by operations in the Central Provinces alone to 40,971 square miles. These Provinces have the largest area of forest land in India, (19,434 square miles), Bombay, Bengal, British Burmah, N.-W. P. and Oudh ; Madras, Assam and Behar follow in the order in which named The Punjab has the smallest forest area, only 1,417 square miles.

The statistics relating to Cinchona cultivation are very interesting, and show the large share Government have in this industry. The two Government plantations, in Sikkhim and in the Nilghiris,covered an area of 3,214 acres under cultivation. There is a small plantation in British Burmah, but the area is not given. The Sikkhim concern had at the end of March 1886, a little over 5 million trees planted out,with 370,000 seedlings and rooted cuttings,which yielded last year 205,410 lbs. of bark. This, added to the stock on hand at the commencement of the year, made a total of 415,131 lbs. available for manufacture during the year. Out of this, 4,625 lbs. of febrifuge were produced. The largest proportion of the trees on the Sikkhim plantation consisted of the *succirubra* variety ; but the more valuable *calisaya ledgeriana* variety is gradually taking its place. The Nilgiri plantations cover an area of 847 acres, planted out with nearly 2 million trees, of which the largest number comprised the *C. Officinali's* The outturn of bark during the year 1885-86 amounted to 113,306 lbs, of which 111,040 lbs. were sold by auction at Madras. The information regarding private plantations is not quite complete or satisfactory ; but from that accessible we gather that they covered an area of 7,204 acres, of which more than half is on the Nilgiris ; Coorg comes next with 1,800 acres, then Bengal and Mysore with 1,200 and 326 acres, respectively ; the whole representing, 10,269,047 plants, which yielded 268,479 lbs of bark at the end of 1885-86.

Perhaps of all planting industries, tea cultivation in India increased in the most marked manner; while in 1874-76 the total area was only 124,836 acres, yielding a little over 26½ million lbs ; it had increased in 1885 to 283,925 acres, yielding over 71½ million lbs. Thus within these eleven years, the acreage under tea increased by 128 per cent ; and the whole outturn by 170 per cent. Of course by far the largest proportion of the acreage is in Assam and Cachar, Bengal coming next. All the rest of India and Burmah put together do not cover even half the area of the Bengal plantations.

Coffee cultivations does not appear to have made any progress during the past few years, and the figures for the two years, 1884 and 1885 show scarcely any difference in the acreage under this crop. The figures, moreover, are said to be so defective as to render it almost impossible to make any useful comparison with former years. The entire area under mature plants in 1885 was 186,326 acres, and the outturn a little below 35 million pounds. The causes which have injuriously affected this industry in recent years, are too well known to need recapitulation here. The entire industry is confined to the Southern Presidency : Mysore, Madras and Coorg between them having 180,000 acres of the total area.

The cultivation of cotton is mostly confined to the Western Presidency and the Hyderabad Assigned Districts. Since 1877-78 the area under this crop increased largely in Bombay, both in British and Native States. Taking it in round numbers, the entire area under cotton in India is calculated at a little over 13 million acres, of which the Bombay Presidency has 4½ million acres. In 1877-78, the area in Bombay was 2,863,000 acres, which increased in 1883-84 to 5,130,844 acres, but fell off in 1884-85 to 4,850,000 acres. This again has further decreased in 1886-87 to 4,393,920 acres. But these figures as well as those relating to outturn and export are acknowledged to be so untrust worthy, that it is not considered necessary to comment upon them.

On the subject of Cotton Mills, some interesting facts are given. In 1885-86 there were 89 mills at work in India, containing 16,748 looms and 2,213,345 spindles. They consumed about 233 million pounds of Cotton in that year, and employed on an average about 71,577 persons daily. The nominal capital of these mills is returned at 848 lakhs, but it is calculated that it is not short of 1000 lakhs, or in conventional exchange, 10 millions sterling. Bombay has 67 out of the 89 mills, the remainder being divided between Bengal, Madras, N-W. Provinces and some of the large Native States. As an intstance of the rapid development of the industrial resources of this country, it is noted that the past 12 years have seen the creation of 52 out of the 67 mills now working in Bombay The same may be said of the other provinces ; in fact, that the mill industry of India was only passing out of its infancy twelve years ago

Of Jute mills, there were 24 at work at the end of the official year 1885-86, all of them, with one exception, being in the vicinity of Calcutta. They employed over 47,600 persons, and worked up about 152 thousand tons of Jute during the year. The mills represent a capital of about 300 lakhs, (3 millions sterling at conventional exchange), but the figures are incomplete in many respects. This, like the Cotton-spinning industry, has practically grown up during the past 14 years. There are only four woollen mills in the country, and these are only in their infancy, the oldest having been in existence about seven years. They represent an aggregate capital of 17 lakhs.

Of paper mills there are yet altogether five in Bombay, two in Bengal, one at Lucknow and one at Gwalior. Of these, three are private concerns, and the rest represent an aggregate capital of Rs. 3,868,000. Six of the mills are reported to have turned out paper of the aggregate value of Rs. 17,79,954 during 1885.

The brewing industry in this country has developed very largely during the past seven years, and Indian brewed beer is now almost entirely consumed by the British troops out here. There were altogether 24 breweries established in India, of which five closed between 1879 and 1883. The outturn of beer rose from 1,569,000 gallons in 1879 to 3,150,342 gallons in 1885, of which the Commissariat purchased 1,982,777 gallons, against 349,100 gallons in 1875. The average purchases of the Commissariat for the years 1881-84 amounted to 1,809,205 gallons yearly. The imports of English beer for Government in 1885-86 only amounted to 375,396 gallons against 1,505,062 gallons

in the previous year. Nearly all the beer now consumed by the troops in Northern India is Indian brewed, and the displacement of imported beer elsewhere is only a question of time.

Coal mining is now an established industry in this country,for there were no less than 95 collieries at work in 1885, of which Bengal alone had 90 ; the others are situated in the Central Provinces, Assam and Central India The total output of coal in 1885 was 1,294,221 tons. There is every reason to believe that coal exists in great quantity in India, and only awaits prospecting and working.

The above represent the principal large industries of India There are a great many other large industries, such as silk mills, rice mills, Timber Mills, Indigo factories, Tobacco farms, Sugar works, &c., the returns for which are more or less imcomplete, and we do not therefore notice them separately here.

AGRICULTURAL OPERATIONS IN THE N.-W. PROVINCES AND OUDH.

The report on the operations of the Department of Agriculture and Commerce, North-Western Provinces and Oudh, for the year ending 30th September 1886, is one of the most satisfactory records of the kind we have yet seen. It is the custom to characterise the departments of Agriculture in this country as mere useless and expensive machines, and the officers in charge of them, as holding so many sinecures under Government, who might be better employed in other ways. The report under notice is a practical refutation of these groundless charges, as we shall presently show,

One of the most important functions of the Agricultural Department is necessarily the efficient maintenance of village records, and a considerable portion of the report is devoted to the working of the arrangements recently introduced. The *Patwari* is of course the material utilized for the collection and compilation of statistics, and it is interesting to note the progress this institution (if we might so call him) has made under energetic and capable management. There was a time when the *Patwari* did pretty much as he liked in the matter of collecting village statistics, and was regarded as a creature to be feared by the ignorant villagers and cultivators, while the information supplied to the district officers was not only untrustworthy and inaccurate, but too often fudged up All that is changed now, and the *Patwari* of to-day is a well-trained surveyor, versed in the Revenue Code, and altogether an almost indispensable appendage to the Revenue and Agricultural Department of the State. Almost every district of the United Provinces has a *Patwari* school, where instruction is imparted in land surveying, mapping, revenue and settlement work, &c. Some idea of the work of these schools may be formed from the fact that since Octoter 1883, no less than 6,708 *patwaris* passed in all subjects, out of a total of 21,639 who attended school. The number who attended school in 1884-85 was the largest on record, having been nearly double that of 1885-86 The total cost of these schools was nearly Rs. 14,000 in 1884-85, against an income of Rs. 7,273 ; while the receipts during 1885-86 had reached Rs 18,956, against an expenditure of Rs. 15,800. The Director, however, observes that in some districts the attendance of candidates at schools is very small, and some difficulty is thereby experienced in getting passed men to fill up vacancies. The causes which operate against these schools are—(1). The high fee of one rupee levied monthly, and (2). The poor prospects held out to *Patwaris* in several districts. To remove the first, the Director recommends the reduction of the fee to four annas if possible ; while the second cause can only be gradually removed. We have no doubt these and other recommendations for the efficient maintenance of village records will receive due consideration by the Government.

The next point of importance dealt with in the report is the reclamation and improvement of waste land, and protection of fodder reserves,and arboriculture. The problem of reclaiming *usar* lands has taxed to the utmost the resources of this hard-worked department. For the past four years an unsuccessful (so far) experiment has been carried out, by simply enclosing blocks of *usar* land, and allowing natural grasses to grow thereon, while at the same time planting out fodder trees in small patches of better land. But the grasses wither away in the winter, while the rank *usar* grass is of little or no value as fodder, and the land shows no signs of improvement. Last year, however, an experiment on entirely new lines was carried out on strictly commercial principles, and consisted of cultivating such land as it was at all possible to cultivate, and keeping stock on the rest. The results were not altogether unsatisfactory, and give ground to hope that by this plan it may be possible to treat *usar* so as to make it yield a fair return for the labour and capital spent on it. The experiment is to be repeated this year, and considerably better results are anticipated. An experimental method of planting trees on the worst *usar* was also inaugurated last year, which is said to be making good progress. In this connection, we note that a writer in the *Pioneer*, in reviewing this report, says :—" We observe that a writer in an agricultural contemporary claims to have discovered a plant which not only revels on *usar*, but actually extracts the salt from it, and turns it into good garden land. We cannot help thinking, however, that we have heard something of this sort before, and the singular fact that these *usar*-loving plants never seem to take to the *usar* of their own accord remains still unexplained." The Agricultural contemporary referred to is the *Indian Agriculturist*, which in its issue of the 26th ultimo, contained an important communication from Mr. Charles Maries, of Durbhunga, regarding the *Inga Saman*, known also as the " Rain Tree," which is described as rendering saline soils fertile, by extracting the salty element when planted therein. Our contemporary not only failed to acknowledge the source of his information, but affected to discredit it. We hope, however, that the Agricultural Department will try the experiment of growing the Rain-Tree on *usar* lands.

Several methods are being tried with the object of cultivating infertile lands infected with *reh* efflorescence in the Aligarh district, and ultimately forming them into fodder reserves No results are published,as it is deemed too soon yet to make any forecast. But a successful experiment by the Collector of Etawah, in the matter of grass reserves, is mentioned. It consisted of enclosing an area of ravine land, and successfully raising a goodly thicket of *babul* trees and large quantities of good fodder grass thereon. A large plantation in the Awa Estate affected with *reh* was reclaimed, and covered with a growth of grass and turf. Boring operations were also attended with considerable success. Eighteen complete sets of boring machines are now on hand, and at work in several district. They have been found of great value as an aid to successful and economical well-sinking.

Arboricultural Operation were carried on with much energy, and the results are very satisfactory, especially from a financial point of view. The total expenditure amounted to Rs. 52,940, and the receipts to Rs. 44,520, thus showing an actual expenditure of Rs. 8,420 as compared with Rs. 34,700 in 1884-85. The total length of roads in the United Provinces is 6,892 miles, of which nearly half was protected last year ; 280 miles of avenue were added during the year, leaving 3,223 miles still to be planted. Nearly 84,000 trees were planted during 1885-86, against 122,545 in the preceding year, and 71-per-cent of the latter are reported as surviving. Forty seven groves were maintained against 51 in 1884-85 ; four new groves were planted and eight old ones removed. All the groves cover an area of 135 acres. In the matter of nurseries, 170 were maintained against 181 in 1884-85. Nine new ones were opened in the Moradabad district, and 20 old ones closed. There were altogether 4,06,685 plants in these nuseries at the end of the year. The Director questions the advisability of maintaining these nurseries, and thinks that young trees could more often be purchased or procured locally at cheaper rates. We do not advise this ; as, if we recollect rightly, the practice of purchasing young trees by the Forest Department was open to much abuse some years ago, and the discovery led to the establishment of Government nurseries.

(To be continued.)

GARDENING IN CALCUTTA.

XI.

FERNS AND THEIR CULTIVATION.

NEXT to the Orchid family there is probably no other genus the cultivation of which is so generally mismanaged in this country, as that of Ferns. Undoubtedly they require careful treatment, and will not endure much rough usage at the hands of the native *malee*, and every one who possesses a garden knows that, with but very few exceptions, these men can never be brought to understand that the same treatment as regards soil, watering, &c., under which such plants as Crotons, Dracænas or Ixoras will flourish, will not answer equally well for such delicate plants as Ferns, Begonias, Bartolonias, &c.; or even if they do understand this much, they are almost invariably too indolent to take any notice of it. It is therefore, necessary, before commencing the culture of this interesting genus, to be fully prepared to take the entire charge of this department, or at least a careful supervision of it entirely into your own hands, otherwise they are much better left entirely alone, for nothing but failure and disappointment can ensue if left to the tender mercies of the class of men to which the majority of gardens in Bengal are entrusted.

Ferns and Selaginellas require shading from the direct rays of the sun, but should have plenty of light, moisture and warmth, some must have more of the latter than others according to the climate of which they are natives. The nearer we can attain to their natural condition of growth the better we shall succeed in their cultivation. To the enthusiast there is probably no more interesting experiment than that of raising ferns from spores, I might almost call it the manufacture of ferns, for there is certainly no other process so apparently artificial connected with the art of gardening. For when we take into consideration the magnificence of structure some attain, the varied and exquisitely beautiful form of others, we cannot but wonder that such beauty and grandeur should owe their existence to a source which just claims a name above nothing. With such slight materials to build the structure from, we might attribute the bulk of success to art, but I shall say no more about manufacture since we must depend on nature still to give life to the germ. Before entering on cultural details, I shall try to describe some of the most prominent features and parts that go to make up the structure of a fern, and that part of a fern we are more directly concerned in—the spores—I shall endeavour to describe more minutely; in the meantime let us consider the body or larger parts.

Structure.—Three main principles are required to constitute a fern, namely, root, stem and fronds. The roots are filamentous or thread-like, and represented in ferns by their blackish wiry fibres. The stem (caudex, or rhizome), is that part of the plant from which the fronds and roots arise; properly speaking, the general characteristic of a stem is to ascend, but this form of stem, from its appellation, leads us to look for its existence under ground. However we are all aware that there are exceptions to this, that there are tree ferns, as well as creeping ferns. In the leaves or fronds we have that diversity of construction which forms their chief attraction. Fronds are composed of the "stipes," or lower parts, which take their rise from the stem and stop at the junction of the leaves, denominated the "stalks." The rachis, or rib, is but a continuation of the stipes, extending itself along the whole length of the lamina between the pinnæ or leaf divisions, on each side, usually producing secondary ribs, sometimes placed alternately and at other times standing opposite along the rachis. These secondary ribs at times give place to what are termed primary veins, which also are at times split into divisions, but at other times found entire. But I shall not venture further among the mists in case we get like some of those "veins evanescent" and find a difficulty in getting exhumed or extricated, contenting ourselves with things superficial in their nature. I shall now face a few of those awkward technical phrases which must be enumerated as we proceed with our subject.

Fronds are divided into two classes,—simple and compound; of the former there cannot be a modification, of the latter there are several modifications. Fronds that are partly cleft, whose divisions do not reach the mid rib, are designated "pinnatified"; secondly, fronds having their laminæ cleft down to the rachis are pinnate; thirdly, fronds whose leafy parts are twice divided are designated "bi-pinnate"; fourthly, fronds which show their laminal thrice divided are called tri-pinnate." Passing over other peculiarities, I shall now attempt to describe a "sorus," or cluster of spore cases, and then break up the community and enter the citadels of those wonderful particles of vegetable life (the spores), commencing enquiries by placing a pinnae (a sub-division of the frond) of *Lastrea felix mas* under the focus of our microscope. What is conspicuous in the first degree is the shield "indusium" that protects the sorus. The shield has all but rendered its commission, as is evident from the insecure way it rests over the pile of plump brown spore cases (sporangia) and the fact of its skirts being desengaged and tucked up. Suppose we carefully displace this indusium and get a more perfect view of the sporangia. Now we have it! Those who have witnessed the eye of a fly magnified have some conception of the object; the sight is beautiful beyond description, the little globes (each an independent source of sight) closely arranged in successive rings gradually decreasing in circumference and numbers until the top is crowned by an individual, which beautiful regularity is carried out from the base to the summit of what is generally supposed to be the eye. Similar to this is the disposition of the sporangia over its receptacle or post, where the spore cases are united to the fronds. Again, let us prosecute our researches further by breaking up this little store of curiosities, though we are loth to withdraw the eye from a scene whose ever-changing riches varie with every touch of the reflector as the rays of light are augmented or diminished. When the sorus is broken down by a little friction, we have before the eye what appears to be a vast accumulation of broken spore cases and spores, heaped in confusion, and conspicuous amongst these is the broken receptacle itself, half on edge, clearly showing the marks of devastation by its divested look. A few sporangia still adhere to it, but in most cases all that is left are the broken foot stalks. These sporangia which appear globular while in mass, have changed to an oval with an irregular topping process attached to one end, this is the foot stalk. Besides this foot stalk each spore case is encircled with a band lengthwise, something like a string of closely set pearls embracing it. But what is this strange commotion at work? What can be driving the sporangia across our field of observation and scattering their contents like bursting bomb shells in every direction? Now we have it! A strange phenomenon indeed, and equally grand to witness with any of the greater eruptions of nature, because we see in this diminutive work of Providence the same infinite perfection displayed as is bestowed on things to the natural eye more wonderful. The spore cases are exploding, and they altogether present a sight worth seeing. Some are rending in pieces by a slow but steady process, which is caused by the breaking of that elastic pearl band which secured them during the development of the spores within, and they now appear like living things writhing in agony, while fresh convulsions succeed each other; and while every succeeding shook extends the irregular zig-zag like rents, the seeds are ejected all round, nor is it till the seed cases are turned inside out that this rending agent becomes enfeebled and movement dies, leaving its neighbourhood strewn with almost invisible and what appears in the microscope, transparent oval particles. These are the spores.

Having thus far endeavoured to show the wonderfully perfect construction, and the different ends that these objects have severally to fulfil, let us now consider the application of the spores as seeds and subjects of culture. Spores are known to perform the same functions as seeds, and are in every way equivalent to them; yet notwithstanding this similarity in other respects, there exists a wide difference, more especially in their modes of germinating. Seeds give rise to both roots and stems from regularly established sources which Providence has assigned them. Spores differ, inasmuch as they afford stems from whatever part happens to be uppermost, and roots *vice versâ*. Indeed, both start spontaneously when placed in a position favorable to germination.

When collecting spores for sowing, it should be noticed that they are properly matured, which will be seen in most instances from the Indusium being disarranged (where such exists), and of a brownish colour, as well as the sporangia being plump and of the same cast, but we should be certain we are not out-witted even by this rule, as in many instances the spores may already have taken flight. This fact has frequently been illustrated in my experience. While in the act of making comparisons of spores taken from different spcoles, we often find what appears to the natural eye and the feeling between the fingers the finest developed sample to be, after being tried with the microscope, but the shells or spore-cases, while spores there were none.

RUS IN URBE.

(*To be continued.*)

THE TREE TOMATO.

WE have from time to time published whatever information we could collect regarding this fruit, in reference to which much interest was excited a few years back. Its introduction into this country, especially in Southern India, has, we understand, proved more or less satisfactory. It is at present exciting

much interest in England, and the following account of it has been supplied to the *Gardeners' Chronicle* by Mr. D. Morris, the Assistant Director, Royal Gardens, Kew :—

"A full account of this plant was given by myself in the *Gardeners' Chronicle*, vol. xxi, N.S., April 19, 1884, p. 510. It is of shrubby habit, with boardly cordate and pubescent leaves, sometimes a foot long. The flowers are borne in sub-axillary cymes, of a pale fleshy colour with bright yellow stamens. They have the odour of violets. The fruit is about 2 to 2½ inches long, and about 2 inches in diameter When ripe it is of rich orange colour. In the West Indies it is called Tree Tomato ; in Peru (its native country) it is known as Tomato de la Paz. It sometimes appears in Covent Garden market, as I am informed by the editor, under the erroneous name of Granadilla as an importation from the Azores.

"When in Jamaica I was very favourably impressed with the value of this comparatively little known fruit, as it answers in every respect the purposes of the ordinary Tomato, while the plant itself is perennial and easily grown. The fruit is also produced abundantly during the winter months, from November to March, when ordinary Tomatos are not easily obtained. Unfortunately the plant is not hardy in England or in corresponding latitudes, nor will it stand extreme tropical heat. It is, therefore, sub-tropical, and flourishes best in hilly districts in the tropics, with a mean annual temperature of about 68° Fahr.

"During the last three years several hundred packets of Tree Tomato seeds have been distributed to various correspondents in the Colonies, and very favourable accounts have been received of the introduction of this fruit to Ceylon, Southern India, and Eastern countries. Lately Dr. Shortt, of Yaround, sent to Kew a pot of preserve made from the Tree Tomato fruit grown in Southern India."

To the above our contemporary adds the following note :—

The fruit is occasionally grown in this country as we remember to have had specimens sent us for identification, and they have also been exhibited before the Scientific Committee. As is the case with most cultivated plants, there is a considerable amount of variation in the size, colour and form of the fruit. In the *Revue Horticole* for 1881, p. 470, is a second coloured plate representing two varieties obtained from seed of that originally figured. One of these is yellow and we mention the circumstance as we have just received from Messrs. Vicars, Collyer & Co., of Leicester, a fruit under the name of Melon-Pear which is clearly the fruit of a solanum, very nearly allied to, if not identical with the Tree Tomato and with "the egg plant." The specimen sent is seedless, and does not admit of absolute verification, but we have no doubt that the fruit in question is the produce of a solanum. Assuredly it is not a melon and not a pear—sufficiently good reasons to the framers of popular names to call it a melon-pear. It has it is true, much of the fragrance of a melon. We are promised further specimens with flowers and leaves at another time when the identification of this so called melon-pear can be rendered certain. According to an article in the March number of the American *Gardeners' Monthly*, this plant is called in Central America, Pepino, or cucumber.

We should like to know if the experiments with this plant are still continued. We cannot help thinking that the Tree Tomato would do admirably on the Nilgiries, the Shevaroy and other hilly tracts in Southern India. In Ceylon it is, we think, grown successfully.

Miscellaneous Items.

"Every dog has his day," and it would appear as if the manufacturers of oleomargarine in the United States are likely soon to have *their* day, if there is any truth in the following note in the *Farmers' Review* :—"It has for some time been intimated to dairy circles, but rather under the breath for fear of injury and discredit to dairy interests ; that adulterated cheese was being made in large quantity from skim milk and oleomargarine, cotton-seed oil being used to take the place of the cream of which the milk had been robbed, and the product sold as "full cream" cheese, and that such practices were harming materially the trade in American cheese."

The *Foreign Trade Gazette* published at New York, writing on the milling industry in India, says : "A new and promising step has been taken in India in the direction of developing home industries to supply home needs. Hitherto the product of the teeming wheat fields has been shipped to Europe, and from Europe has been brought in return the same wheat ground into flour for Indian consumption. This was a capital arrangement for ship owners and European millers. But it has dawned upon the Native mind that the work of grinding may as well be done at home, and the profits of European merchants and millers saved for the Indian people. Accordingly a great native milling corporation has been formed at Bombay and there are indications that it will be imitated in other Indian cities. This will probably mean higher prices to the wheat-grower and lower prices to the bread consumer, and general advantage to the Indian people. Indeed, says the *Tribune* of this city, from which we quote, "it is not impossible that the milling of wheat for the European market will yet be done within sight of the Indian wheat fields." The idea is suggested that here is an excellent opportunity for American manufacturers of all kinds of milling machinery to introduce their goods into a region that is rappidly coming to the front as a wheat-producing country."

The *Colonies and India* recently published the following paragraph, as to the alleged insecticide character of the tomato plant :—"A curious statement, deserving the examination of botanists at home, comes from Cape Colony, where it is alleged that insects are observed to shun land on which tomatoes are grown ; and the culture of the *Lycopersicon esculentum* is accordingly recommended in all cases where it is possible to grow it under fruit trees, for instance, since the tomato will thrive in the shade of other trees, which few other plants will do—for the sake of the virtues attributed to it as a prophylactic against the inroads of insect pests. The popularity of the tomato as an esculent is sufficiently great to repay the trouble of planting on a large scale, even if its supposed virtues proved to be a myth, and any surplus supplies might easily be preserved in tins and shipped to this country. It will be interesting to know whether the tomato has been observed to exercise any such effect on insects elsewhere—in Canada for instance, where the fruit is so popular—or whether it is only in warmer climates, like that of the Cape, that its peculiar powers are brought into play. Much the same power was once attributed, we believe to the common broad bean, but we are afraid this plant does not 'live up to' its character."—If the writer of the above had seen the tomato plants attacked with insect pests as we have, we fear he would say the same of it as of the common broad bean. We do not know of another plant more liable to the attacks of insect enemies than the tomato, at any rate in this country.

Some time last year we had something to say regarding a new solah topee material in the shape of the dried outer covering of the *Luffa acutangula*, (Toorole). A correspondent writing to the *Gardeners' Chronicle* from the Botanic Garden, British Guiana, asks : "Is there not some mistake about this in the short article (p. 594, *Gardeners' Chronicle*, November 6, 1886) on "Luffas in Japan?" The Luffa, or Loofah, which is used as a flesh-brush, is stated to be the product of *Luffa acutangula*. Is it not rather that of L. cylindrica ? I am well acquainted with these two kinds, and have them both growing here. Being on a visit to the "Old Country" in 1884, after an absence of ten years, I had an opportunity of noticing those exposed for sale in chemists shops, and found them to be identical with the kind, viz., L. cylindrica, we grow here, and use daily for bathing purposes, and which are often made into fancy articles, such as smoking caps, baskets, &c. Both kinds are similar in general appearance, foliage, and flower, the latter a bright yellow, but the fruit is very different, that of L. cylindrica having a smooth skin which peels off clean from the vascular portion leaving it in good order without breaking the outside fibres. It is too bitter in taste to use as a vegetable. L. acutangula has a rough skin with longitudinal furrows and sharp angles or edges, from end to end ; this rough-skin does not peel off like the other but breaks into small pieces clinging to fibrous portions. The full-grown fruit is of the same length as that of its congener, but is much thicker, containing quite half as much again of the fibrous substance, which would make it an admirable material for padding. In the young condition the fruit before the vascular portion is properly formed, is an excellent vegetable quite equal to the best Vegetable Marrow. It is grown here for that purpose, but is not sufficiently known."

A few week's back we published Professor J. L. Budd's views regarding the girdling of fruit trees to make them bear more abundantly. The following, from a correspondent of the *Farmers' Review*, gives the other side of the pictures:—"While I would not attempt to criticise Prof. Budd, Mr. Spaulding, or any one else who has had greater experience than myself, I cannot refrain from re-

lating a little experience I have had in the girdling business. Several years ago I came into possession of a farm that had several trees that were very thrifty, and were large enough to bear, yet persisted in growing wood instead of fruit. I thought them good subjects on which to try the girdling theory, then so highly lauded by the horticultural press throughout the land. During the month of June I carefully removed a ring of bark from a number of trees. The rings were of different widths on different trees, ranging in width from one-half inch to four inches. The wounds on some of the trees were covered with oiled manilla paper, some with several thicknesses of cloth and some left exposed. The next season the trees from which the very narrow ring was taken, also those covered with paper and cloth, bore but little fruit. If I remember right not much more than trees of the same varieties ungirdled. The balance of the girdled trees "bore quite heavily and have continued to do so each alternate year since, but not so fine fruits, and for a year or two not so much of it as the trees that were never mutilated; neither are the trees so large, thrifty or healthy. Last October we had a small cyclone that tore up by the roots and broke down quite a number of apple trees for me, and among them, some of those experimented with. Lately we have been cutting up the trees, and in every instance except one, we found the girdled trees were decayed, either near the place girdled, or at the heart, and one half of those ungirdled were not affected in the least. One of the trees now standing has an enlargement at the place were the operation was performed much like that often seen in grafted trees, at the place of union of the two sorts, but whether it is sound or not I do not know. The rest standing are still thrifty and healthy, and are I believe the ones from which the narrow rings were taken, or those covered with cloth or paper, though I cannot say for certain. I am aware that from this single experiment not much can be told, but I have for the past four seasons girdled other trees, and shall keep at it and report results if at all marked."

Selections.

THE INDIAN WHEAT TRADE.

[*Pioneer.*]

THERE are one or two points in the very interesting letter from "A Calcutta Exporter" published in our issue of yesterday which seem to invite comment. Our correspondent, not without a good deal of reason it is true, speaks somewhat satirically of the "absurd, and impracticable proposals" which have occasionally emanated from Government officials, more anxious to attract the attention of their superiors than capable of writing to the point; and though he very justly excludes Mr. Donald Smeaton from this class, he thinks it "a little startling to find Mr. Smeaton, in brave defiance of political economy, fixing definitely the cost of production and the margin of profit on American wheat. Now, with regard to this point, it is difficult to see where there is anything "defiant of political economy" in stating the average cost of production of a quarter of wheat in a particular country. In America, Mr. Prince, the author of a book on "American farming," Mr. Rudolph, the Secretary of the Chicago Board of Trade, and many others, have given estimates of the cost of wheat production in the States; and a similar work was done in India long before Mr. Smeaton wrote on the subject. The estimates are, of course, only approximate, and they are liable to periodical revision; but in comparing the conditions of production in different countries at a particular time, they are not only useful, but indispensable. Our correspondent further says that Calcutta merchants never try to make an unfair profit out of the refraction system, and that something like the "independent authority" desiderated by Mr. Smeaton, already exists for classifying the consignments from up country. We are glad to hear that our correspondent's experience has led him to this conclusion; but Mr. Smeaton's statement to the contrary was, it will be remembered, based on information supplied by the English representative of a well known Cawnpore firm, and by a large number of native commission agents in Meerut and Muzaffarnagar.

Whether, therefore, the Calcutta merchants mean to deal fairly, or not, the fact remains that the up-country dealers do no trust them, and are not likely to do so until some other independent authority is set up, so that until that time the evils of the refraction system must remain. Our correspondent speaks of "the steady deterioration of Calcutta linseed" which has taken place since the "extreme shrewdness" of the London importer—a shrewdness, he admits, "defeating its own purpose"—introduced the refraction system there. So it is in the wheat trade. Sometimes the up-country dealer, and sometimes the merchant at Bombay or Calcutta, will gain, but meanwhile the wheat of India in discredited. Our correspondent throws all the blame for the perpetuation of the present system on the London importer. As we have before said, if the Indian merchants have done all in their power to show those of Mark Lane that they could get clean wheat, if they paid for it, this is quite just. If however, as our correspondent seems to imply, the Calcutta merchants merely look on the question as one of demand and supply, being willing to send dirt or chaff, or peas aboard, if the foreigner is ignorant that clean wheat can be supplied, without any attempt to dispel the illusion, they are certainly not balmeless. To see that the products of a country take as high a place as possible in foreign markets is one of the most obvious functions of a Chamber of Commerce. The Bombay mill-owners pay a salary to an Aden firm to disseminate information regarding their manufacture; to the Indian wheat merchants this is possibly a "brave defiance" of economic law. Our correspondent thinks it necessary to prove that it would be better for the Indian trade were the wheat pure instead of dirty and adulterated, since, "despite its admixture, it is yearly supplanting the cleaner American varieties." This either means that the success of Indian wheat is partially due to the fact that it is in part not wheat at all, which is a statement almost too marvellous even for a "commercial economist" to make, or it means that the success has taken place, truly, in spite of this dirty fact, from which the inference is that it would have been greater had no such fact existed.

To THE EDITOR OF THE ENGLISHMAN,"

SIR,—In your issue of the 8th instant reference is made to a paper of Mr. Smeaton, Director of the Agricultural Department, North-West Provinces, with regard to the wheat trade of India Mr. Smeaton's remarks on the trade usance of selling wheat with five-per-cent, refraction, show his imperfect acquaintance with commercial affairs, and his attempts to prove, with mathematical precision, how the poor native trader is disadvantageously treated by the European merchants of Bombay and Calcutta, go a long way to confirm this impression. It is strange, indeed, that Mr. Smeaton, in his wanderings in the North-West Provinces, should never have met or made the acquaintance of the Marwarri native merchant, who more or less monoplizes the intermediate trade in wheat between the cultivator and the European merchant at the shipping ports. This Marwarri trader has the reputation of being as keen a man in business as any Jew in Europe or any Scotchman aboard—proverbially looked upon as the smartest men in business. Mr Smeaton also alludes to the bribery frequently practised with underlings to get goods passed at a more favourable refraction than the wheat tendered for delivery really contains, at the expense of the European merchant; no doubt a deplorable state of affairs, thinks Mr. Smeaton, and the same feeling is shared by the merchants in Bombay and Calcutta, especially when they see their rupees go in a wrong direction. To improve such irregularities in the wheat trade various questions and remedies are propounded by the Director of Agricultural affairs

The idea of cleaning Depots is not original, but was suggested four to five years ago by a firm in Calcutta, with the view of having a store at the Bally railway station. An up country firm of European grain merchants also suggested an elaborate plan to the Government of the North-West Provinces, to have a cleaning and receiving station at Cawnpore as a centre of an important wheat district. The old station of the East Indian Railway, with buildings and sidings all ready, offered special facility for such a trial. The railway authorities were most anxious to promote it, but the Government did not see their way to let any of their officers of the Agricultural Department share the responsibility of supervision.

Similar application was made by the Sind-Punjab Railway Co. to the India Office at home, to allow the building of goods sheds for the reception of grain previous to transportation in train loads direct to Karachi, with the object of saving expense at the shipping port and to develope as carriers a system of 'giving through' bills of lading, including railway transport, from a station in the Punjab to London or Liverpool direct. The proposal was disapproved by the home authorities: the Railway Companies where simply to act as carriers, but not as warehouse-men.

The competition of various railway lines then led to the custom of receiving goods at all small out-stations, and the trade, instead of being centred as in America, became scattered. Unfortunately for the trader, the goods brought for despatch found not always

shelter, because at many of these small railway stations no provision was made to fulfil the duty of a carrier, to take proper care of the goods delivered to him for transport. During the rainy season when there was a little activity in grain business, it was not unfrequent to see bags of grain lying on an open platform, or next to it, exposed to alternate rain and sun, a new crop sprouting through the double bags which however were in many cases brushed up outwardly on arrival at Howrah to avoid claims for apparent damages. Before Mr. Smeaton elaborates his scheme for carrying grain in bulk by rail, it would be better to take a previous trip round the railway lines in the N.-W. Provinces and Oudh to see how railway platforms are prepared for receiving goods of a perishable nature. The Director of Agriculture should bear in mind that wheat exposed in this hot humid climate is very liable to be attacked by weevils, and if hitherto the risk and losses arising from this source have been limited it is chiefly owing to the custom adopted by the merchants of having grain packed in double bags. The proposal of having grain arriving in bulk, stored cleaned in a Calcutta Depot, and poured into the ships hold, is neither practical nor judicious for the above reasons, and above all is prohibited under the rules of the Board of Trade for ships or steamers.

Many years ago the grain from Russia and North America was carried in bulk, but the maritime losses became so large, the loss of human life assumed such proportions, that insurance offices and public feeling alike protested against it. The Parliamentary papers with reference to the Plimsoll" enquiry will afford a useful study on this subject.

Mr. Smeaton's further suggestion is that an honest man from London should be engaged by Government to act with officers of the Agricultural Department as a sort of Vigilance Committee upon the doings of the Bombay and Calcutta merchants, or their appointed "Wheat and Seed Committees." This is rather a cruel suggestion, seeing that the merchants supplied all the knowledge Mr. Smeaton has got of wheat, in a kind and ready way, on many occasions when information was wanted.

If the Government of India is really so anxious to correct the wheat trade and to check and reduce the admixture of impurities, as Mr. Smeaton suggests, would it not be better to establish at once a "Wheat and Seed Adulteration Act" for which there is at least a precedent in the "Cotton Frauds Act," of twenty years ago, when the Manchester spinner wanted clean cotton? However, Mr. Smeaton modifies his views by showing that a certain percentage of impurities cannot be avoided, owing to the vicious system of the cultivator of growing seed and grain of different kinds intermixed on the same field; and partly owing to the primitive mode of separating the grain from the straw. That the Director of this Department shows some ambition to out-rival the American wheat trade with England, by pushing India to the front may be excused, but the trade with America has more solid supports than the merchants in India can command. The American trade fixed its own standard, not by brokers in Europe, but at its own Corn Exchanges at Chicago and New York. The American trader will sell Red Winter 3 upon a Chicago certificate; while the Calcutta merchant has to sell his Club No. 2 upon an imaginary standard of the London or Liverpool broker. Before Bombay and Calcutta merchants can emancipate themselves they can only protect themselves by establishing a standard for local business, under the rules of the Wheat and Seed Association, to adjust their transactions with native merchants. To have a man from London, who knows nothing how usances of trade have arisen in this country, would be merely useless vexation and interference. Mr. Smeaton also wishes the London merchants to put pressure upon the naughty European merchants in Bombay and Calcutta, but I fail to see for what purpose. Moreover Mr. Smeaton is perhaps not aware that most of the firms in Bombay and Calcutta have a corresponding firm in London, and therefore are as much English merchants as Indian traders.

Why not reverse the picture and recommend to such London merchants, or English millers, as are dissatisfied with the existing order of things, to send out their own confidential agents to clean and ship special classes of goods which suit their particular requirements? There is nothing to prevent this, they will be quite welcome especially if they bring the money with them, an article that is getting rather scarce in India.

It is satisfactory to learn that the Government Agricultural Department is making laudable exertions to arrive at a greater uniformity of grain, by distributing specially selected seed grain to the cultivators. We may hope to have in time a better standard and a higher class adopted in our local trade. In the meantime our merchants have been under the necessity of fixing their stand- [illegible] for the same reason, and no doubt owing to the same cause, which Mr. Smeaton assigns. We cannot get always clear and even wheat from an ignorant cultivator.

When the facilities for shipment from railway waggons to the ship or steamer improve, the merchants here will no doubt be found equal to the occasion, and make be best use of it. The records of the Bengal Chamber of Commerce show for how many years the merchants have petitioned to have the railway bridge made, instead of having to go for their goods to the other side of the river.

In striving to rival the great Republic in the wheat trade, the Indian merchant finds himself severely handicapped in more than one quarter. There is no warrant system, and there is a very poorly developed financial agency. In America the capitalist is enterprising and venturesome almost to excess, but in India, with the exception of some classes in Bombay, the capitalist is a miser and land grabber. The Government of the United State's returns in agricultural affairs are unrivalled, and enlighten the public by works (like the Food and Land Products in the States,' for which Congress voted 600,000 dollars) containing the most minute and reliable information.

India, a great agricultural country, with 250 million inhabitants, of whom about three-fourths are connected with agriculture or the produce from the land has only an experimental staff of amateurs to advise and guide this great population in progressive agricultural science. There is a remarkable passage in Mr. Smeaton's paper dilating upon the one thing needful, "the strong motive of self-interest in up-country traders to be brought in active operation, and to re-act on the cultivators in a way that no Department of Agriculture or any other power on earth can act. Let the desire and, certainty of gain from trading in a high quality of wheat, &c." Mr. Smeaton may rest assured the desire is all there—but the certainty of gain? If the latter point was equally clear, the cleaning machine would soon be in active operation. It only adds a few extra annas to the cost per maund, that is all. If the Director of Agriculture can find time and opportunity to consult the native up-country trader, the Marwarri grain dealer, and suggest to him to make direct shipments, on his own account, of specially cleaned wheat to London, he will probably be surprised to learn that this native friend by no means deficient in keenness, to appreciate an extra profit, will flatly decline the invitation, and much prefer to deal with the merchant of Bombay and Calcutta, where he can see his rupees.

Surely it is not the business of the European merchant in this country to do what an unaided Government Department of Agriculture finds difficulty in accomplishing, to make the Indian cultivator a keen, enterprising, intelligent, clever, thrifty farmer.

It is in fact, most difficult to realise the object of Mr. Smeatons paper, unless he means to demonstrate that the European merchant of Bombay and Calcutta has to accept all the risk, that the native trader and cultivator may realize all the profit, and the Agricultural Department all the glory, embellished with stars and crosses!

I must apologise for the length of this letter.

A. TRADER.

INDIAN TEA FOR TIBET.

DARJEELING, APRIL 8.

A WRITER in a recent issue of the *Indian Planters' Gazette* gave extracts from a letter, evidently from Pere Desgodin at Pedong on the Tibet frontier, where the good Father has now been settled with a few other priests for some years regarding the manufacture of brick tea for Tibet, and these extracts and the letter itself are deserving of a few remarks. While prepared to accept Father Desgodin as about the best-informed authority we have on the subject, because of his long residence among the Tibetans and of his personal knowledge and acquaintance withe the tea used in Tibet, I am unable to accept all he says as gospel truth, for the good reason that the Father has lost sight of two most important factors in his scheme for supplying Tibet with brick tea from India, and these are: how are we to get tea to Tibet after making it, and, having overcome this difficulty, how are we to sell it when we get it there? The difficulty of making brick tea on which the Father lays much stress is a mere bugbear, as most old Darjeeling planters, such as Curtis, Christeson, Munro, and others, have gone thoroughly into the matter, and know all about it, and are prepared to make as much good or bad tea (that used by the common and poorer classes is made of coarse leaves and stalks), as the Tibetans require. There is really no difficulty in the way, as may be gathered from the fact that our present Deputy

Commissioner, Mr. Paul, who takes a more than intelligent interest in this and all other questions calculated to develop the industries of the district and enrich it, brought up with him from Calcutta some tea which had been pressed into cakes for the use of our troops in Burmah and gave it to the deputations and influential lamas who came in from Sikkim and elsewhere for the Jubilee and they after using it declared that, except for its freshness it was exactly like that used by the higher classes in Tibet, and that they would use it just as readily were it only a little older and more seasoned. They were surprised to hear how cheap it could be bought as compared with the price of the Tibet tea.

The real difficulties of making a market for our tea in Tibet will be those referred to above. Not one pound of our tea has ever been knowingly allowed by the Chinese to enter Tibet, and not one ounce will be allowed to enter so long as we are content to do only "talkee, talkee" with John Chinaman. We have it on record that an enterprising Tibetan trader, who managed to smuggle a maund of tea from *Darjeeling* into Lhassa a few years ago, had his tea seized and destroyed, and besides being heavily fined spent years in jail for the offence. In addition Col Guj Raj Thapa, the Nepalese Commander, and Chief officer on our fronter, was asked when in here the other day, why he was content to sell his tea for four annas a pound at Calcutta, when he had such a good and profitable market as Tibet under his elbow, and his reply was that it was no use sending tea to Tibet, as he had sent a large quantity to the agents of his Government at Lhassa, and it remained there to rot ever since, as the lamas and Chinese authorities would not allow one ounce to be sold, and prohibited the people from buying it under pain of heavy punishment.

Now if Nepal, with its agents and influence at Lhassa, backed by the prestige of its recent political triumph over Tibet, cannot sell tea there, how are we who are not even allowed so send our tea over the frontier and have neither agents, influence, nor prestige to sell tea make it as we may in Tibet?

The fact is that John Chinaman finds Tibet such a good mart for his own trash that he is not such a fool as to allow us a finger in the pie, specially as he is' cute enough to know that our produce is so superior to and so much cheaper than his own, that the whole hand would soon follow the finger. No, as long as they possibly can the Chinese will not allow Indian tea into Tibet; they known better. So long as our diplomatists are content with "talkee, talkee," John will rub his hands, smile blandly, and promise everything in the way of fere trade with Tibet, but will never permit it in reality. He will send us a little wool, musk, &c., as heretofore, because he cannot do better with such merchandise himself, and because the people must get money readily and quickly to pay the taxes, and will allow us to send tobacco, cloth &c, but no tea, if he knows it.

The writer of the letter talks of the "misguided Macaulay Mission." I thought that every one knew by this time that the mission was lost between Pekin and London, and not between Darjiling and the Jeylep Pass, and that Mr. Macaulay's connection with the Mission simply consisted in doing from first to last all that a clever, able man could possibly do to make it a success.—*Englishman.*

THE SILO AND THE DAIRY.

The following abstract of an address by Hon. Hiram Smith before the recent Farmer's Institute at Whitewater, Wis., we take from the columns of *Hoard's Dairyman*. It is a matter of interest to all dairymen.—

"Hiram Smith spoke of dairying in general and particularly of his own experience with the silo, as he finds results from its use. He said that there were many things he had thought were proven and might be relied upon as established truth, that we find, later on, are still problematical. He has no misgivings on the necessity of growing great crops on the dairy farm, or the great value of corn as the cheapest forage food for stock, or of the necessity of having a silo to surely and cheaply preserve it, or that an increase of stock on the same farm could be easiest sustained by its use; but he had to take the testimony of his churn, that feeding with cheap food made a product of milk of less butter value per 100 pounds of milk, than feeding the same cows on dry corn stalks in the place of ensilage, and with the same clover hay and grain, yielded. His gain through using the silo, thus far, came through the exceeding cheapness of the forage-ration of corn—ensilage—and not from increase of butter per day, or per cow, notwithstanding he had an actual increase in the weight of milk, and also bulk of cream. He thought that the increase in product reported by those who made milk and cream, if tested by the churn, would hardly bear the crucial-test-yield of butter fat. This was no argument against the silo, however; but only a warning that all milk at last, must come to the test, and be considered it worth just what it could show up for in available solids. Whatever the truth is, that we shall have to come to at last. No advocate of ensilage could have more faith in many of the good things it would aid in accomplishing then himself, but the facts so far as he had found them, showed the gain did not come from increasing the butter yield per 100 pounds of milk. The excellence of the product and the comfort and health it gave the cows, were undisputed and patent facts; and because of the uniformity with which animals could be fed with it, no matter what the weather or the season, made a gain per annum, and added certainty to the yield and results.

As to who should use and build the silo, he said it was no use to a man who had a large farm and was not developed into the knowledge that he ought to feed more stock and make more manure than he does now. The man who would not keep stock enough to half consume the straw and hay the farm raises, and who would not try to make milk in winter so as to get two or three prices for it, when there was a sharp demand for its products, did not need a silo. Such a man was seeking to tread down and make manure of his hay and straw without having animals eat it; so he did not need a silo to help him half-waste it in the manure. He needed to know that the farm needed more mouths on it, that more manure might be made; and also know that the manure he did make needed to be fertilized through the grain-feeding of the cow—feeding the nitrogenous grain consisting of oat, oil-meal, bran, and shorts, and then getting the cost of them once in the milk, and again in added fertility to the fertilizers—before he could appreciate the need of a silo. His farm would yield meagre returns however, till he got some of these conditions of success and would begin to yield just in proportion as he employed them intelligently. We need more, now, to fill our place in the ranks of a decent civilization than the people did 50 years ago. He believed that a diet of dried apples and beans, would keep a shiftless farmer alive, now, just as many days as ever it would, but the man who toiled to live that way made a mighty poor modern farmer, as well "as general purpose man," in the community.

On the cheapness of his food he said he was feeding his full-milking cows for 15 cents per day, and that they were earning more than twice that sum from butter alone, and he had the skim milk and highly fertilized manure besides.

As another reason why farmers should feed grain to their cows, he said that in Ohio it had been abundantly proved that the farmers who sold milk in Cleveland, or who took milk to the cheese factory, and stupidly refused to buy or feed grain to the cows had run down the milk yielding capacity of their farms, not so fast, but just as certain, as the selling of wheat continuously, had done for other sections.

It would be the same here if the same methods were practised, The success of those who took back in bran and shorts, the elements that milk exporation from the farm took away, the dictates of common sense, and the loud voice of the truly friendly chemist, ought to teach the farmer how he can easiest fill his own pocket and make his farm grow better at the same time."

FODDER AND FEEDING.—IX.

By Dr. A. P. Aitken.

In the former chapter it was shown that a very large part (on an average not much more than the half) of the nutritive matter contained in the rough fodder of farm stock is digested by them. By rough fodder is meant the various kinds of hay and straw which frequently form the chief if not the sole, diet of wintering stock. But in order that stock may not only be kept alive and in good health, but that they may go on improving in condition, it is necessary that some more nutritious food be given along with their rough fodder. Food of this kind has been designated by the name or *by-fodder*, and it includes all such substances as beans, peas, corn of various kinds, wheat bran, linseed, and other feeding cakes or meals, and various artificial feeding stuffs. The chief characteristic of these by-fodders is that they contain a much higher proportion of albuminoid matter than is contained in the rough fodder. By the addition of such substances the food is rendered more nutritious, or, as it is called, more *concentrated*; or, in other words, the ratio between the albumen and the carbohydrates of the food is a closer one. We shall have to adopt a more precise method of stating this ratio by and by, when we use it as a means of measuring the effective feeding power of various kinds of dietaries. The feeding ratio has to do only with that part of the food which is

digestable: and as we have referred in very general terms to the digestibility of the food constituents contained in rough fodder, we must now say a few words regarding the digestibility of the by-fodder.

When an animal is fed on rough fodder alone, it is comparatively easy to discover how much of the various constituents of its food have been digested. If we analyse the food which it eats, and subtract from the results the quantity of food constituents contained in its dung, we can, with certain precautions which need not here be referred to, determine very precisely the nature and amount of the food material that has been digested, and by so doing measure the digestibility of the various constituents of the rough fodder. But if, in addition to the rough fodder, we give the animal a certain amount of by-fodder which contains the same constituents, only in very diffent proportions, it becomes more difficult matter to say what proportions of the constituents found in the dung have been derived from the rough fodder, and what proportions have been derived from the by-fodder. It may be that the by-fodder exerts some influence upon the digestibility of the food constituents of the rough fodder, causing them to be better or worse digested. It is evident that this is a great difficulty and it is one which has occupied much of the attention of investigators in this branch of knowledge, and given rise to a great amount of most pains-taking inquiry. There is no way by which an investigator can distinguish the constituents in the dung that are derived from the rough fodder, from those derived from the by-fodder. All that he can do is to analyse the foddor and the dung, and from these two data draw his conclusions. But if he had fed an animal for some time on a diet of rough fodder alone, and has by that means accurately determined the digestibility of the various constituents in the fodder, he may add to the animal's diet gradually increasing quantities of a substance which he knows is perfectly digestible, and notice what effect this addition has upon the digestibility of the various constituents of the rough fodder. On the other hand, he may assume that the digestibility of the various constituents of the rough fodder are in no way effected by the addition of certain gradually increasing quantities of by fodder, and by this means arrive at certain values indicating the digestibility of the various constituents of the by fodder.

Very many experiments made in this way have enabled investigators to arrive at some important conclusions. It has been found that when perfectly digestible albuminoid matter is given as a by fodder, it does not cause any diminution in the digestibility of the albuminoid matter; or other constituents of the rough fodder. In making experiments of this kind, it is needless to say, that, in order that they may be of any practical use, they must be made under conditions resembling those to which animals are subjected in ordinary stock-feeding experience, that is to say, the proportions in which food constituents are given must resemble those which are found to be favourable to health and progress

When the various forms of food included under the name of by-fodder are given to stock in varying quantities along with their rough fodder, it is found that the albuminiod matter and other constituents contained in them are not entirely digested, although they are more easily digested than the food constituents contained in the rough fodder. As the result of many experiments, it has been found that the constituents of some of the more impertant kinds of by-fodder are digested on an average, and in round numbers, in the following proportions per cent:—

	Albumen.	Woody fibre.	Fat.	Carbo-hyd't's.	Total. organic matter.
Bean meal	88	72	87	92	88
Peas meal	89	66	75	93	89
Linseed ...	98	91	85	63	84
Linseed cake ...	86	44	90	80	80
Rape cake ...	81	8	79	76	65
Cotton cake, decorticated ...	85	0	88	95	80
Cotton cake, undecorticated ...	73	23	91	46	50
Oats ...	77	17	82	74	68
Barley	77	0	100	87	81
Maize ...	73	62	85	91	88
Locust beans	68	78	53	95	94

These proportions are arrived at under the assumption that the digestibility of the constituents of the rough fodder are in no way affected by the addition of various quantities of by fodder. All these by-fodders are rich in albumen, and the digestibility of their albuminoid matter and other constituents, except woody fibre, is far greater than in the case of rough fodder. It is a very important matter for feeders that this is so, as it enables them by addition of comparatively small quantities of these substances to rough fodder to make a rapid increase in the nutritive power of an animal's diet.

If, instead of adding to an animal's food such highly albuminoid substances as the above, there is given some kind of by-fodder rich in carbohydrates and poor in albumen, it is found that the excess of carbohydrates thus contained in the diet has the effect of lowering the digestibility of the albuminoid matter in the rough fodder. Even sugar, if given in quanties greater than one-tenth of the whole diet, is found to prevent in some measure the albuminoids of the food from being digested; and if the quantity of sugar is much increased, the digestibility of the albuminoild of the rough foddor is very greatly diminished. But that is not a kind of feeding that any one would attempt. The object of giving by-fodder is to improve the composition of the rough fodder which is already too rich in carbohydrates, and that is to be done by increasing the albuminoids in the fodder.

Fat, when added in small quantity to rough fodder, does not diminish its digestibility in the same way as sugar or starch does, and especially if the fat is contained as a constituent of the food, it is found that it is itself well digested, and in no way injurious. If oil itself, such as linseed oil, is added to the daily fodder of an ox or similar animal, it is well digested so long as the quantity does not much exceed about half a-pound of oil for every 1,000 lbs. live weight, and in the case of animals fattening or giving much milk the addition of such a quantity of oil is attended with marked benefit; but when the proportion above given is much exceeded, it is found that oil gradually dulls the appetite of cattle, and that it not only diminishes the digestibility of their fodder, but when given in excess it may entirely ruin their digestion,—*North British Agriculturist.*

THE RUBBER-TREE PLANTING INDUSTRY IN CEYLON

THE result of a considerable amount of inquiry into the present condition of the rubber industry in Ceylon, has led us somewhat unwillingly to the conclusion that, for a time at least, the pursuit may be considered to be in abeyance—if not altogether abandoned by the majority of the planters who were so keen about it a few years ago. There are, it is true, scattered over the island a great number of properties on which are now growing Indian-rubber trees of various kinds, more especially the "Ceara" kind, and on the selected estates from which we have authentic returns we find an aggregate of 150 acres under this cultivation. But if every patch of rubber trees in the country were counted, a much greater area would be made up. Generally speaking the age of the trees under reference is from four to five years, and the growth would appear to be in nearly all cases satisfactory, say from 15 to 40 feet. From but one property is there any statement to the contrary, and here we find some five acres planted on poor soil at an elevation of only 30 feet above sea level. The growth is reported "poor and scanty." The lowness of elevation in this case has probably but little to do with the unsatisfactory growth of the tree, as is evidenced by the flourishing condition of specimens in Colombo, at even less elevation than 30 feet above sea level. The experiments that have hitherto been attempted in extracting the gum from the trees have so far resulted in disappointments There is however a general concensus of opinion that the trees on which these experiments have been tried are too young to produce satisfactory results. Should such be the case it only requires time to effect a cure, and if the rubber can be grown in otherwise unprofitable portions of ground it would be well to continue cultivation with a view to paying results at some future day. There are one or two points which must be taken into consideration in noticing the experiments which have been made in tapping the young trees As a rule the tost has been so much per cooley, at so much value. It must not be lost sight of that coolies unaccustomed to any particular kind of work—no matter what it may be—cannot do nearly so much in a day when new to the employment, as they will after a time when they have got their hands accustomed to it. Moreover, in a new industry like that under reference, the master is no more acquainted with the proper *modus operandi*, than the cooly, and is unable to task the coolies employed in the work.

The cultivation should not be condemned off hand, because the coolies employed in collecting are unable at first attempt to bring in more than ¼ to ½ lb. rubber. Methods no doubt would be discovered after a time of causing the cuts or punctures in the bark to bleed more freely, in the same way as the Natives induce the sprathes

of the jaggery (kittool) to give out a greater amount of palm juce than they would by a simple cut with a knife.

Though we cannot but take into account the exggerated tone which pervades the whole of a letter we append, which a Native firm has received from Java, we may without fear of being misled take it for granted that the tapping old trees may without harm be carried on from day to day for some months at a time, a process which, so far as as we can learn, has never been attempted in Ceylon, —probably for want of some older trees on which to experiment The result mentioned from Java of 25 lbs. per three-year old tree in five months, we look upon as altogether apochryphal, though it might be credible did the experience refer to large forest trees like our own *Ficus Elastica*. The fact mentioned by one writer of his collecting the rubber from the abrasions caused by blows of a heavy stick on the bark of the Ceara tree, remind one of the traditions of the old Royal College boys in Colombo who used to break the bark of the protruding and tortuous roots of the common indigenous trees, and wind off the rubber as it exuded from the abrasions, until they got elastic balls nearly the size of those ordinarily used for cricket. It has been urged with some show of plausibility that our local Government should encourage the growth of this common wild India-rubber, on the otherwise profitless banks of the low country rivers, in view of the possibility of its being able at some future date to issue licenses for the collection of the produce, or at any rate, to create a value for land, which at present is altogether unproductive. One of the lessons learnt during the few years in which Ceara rubber has been established in the island, has caused an entire revolution in the make of rubber nurseries. When first introduced into the island the seeds were sold at so much a hundred—germinated seeds, or seeds with the ends filed to facilitate germination—and in spite of all precautions a very large proportion of the seeds were failures; while in contradistinction to this experience the seeds of the Ceara falling naturally on the surface of the ground, and left to their own sweet will, sprang up like weeds under the parent trees and became rather a nuisance than otherwise Observation of this fact led nursery-makers to merely turn up and soften the soil, throwing the seed on the surface and just covering with dead leaves, and a sprinkling of soil sufficient to hide the seed from the direct rays of the sun. Under these conditions the seeds seldom fail to germinate quickly, even after having been left for months, even years, without any special care being taken of them. Of the rubber creepers such as come under the variety Landolphia, we can get but little information for our planting correspondents: no results further than ascertaining the capability of a few localities for their growth have as yet been attainable, though we hope in a short time to be able to learn something more about them, especially from the low, hot, moist districts. It is impossible to observe without regret the very prevalent disregard by the planter in Ceylon of what at one time it was hoped would eventually prove a very lucrative industry, and the produce of which is becoming daily more valuable for a number of processes connected with electricity and telegraphy. The fact of the matter, on doubt, is that facility of production and resulting profits were at first so grossly exaggerated, that when actual results were ascertained by experiments on a fairly large scale, the disappointment was correspondingly great—and with rather unusual precipitency discredit was thrown upon the whole concern, and it is no longer thought worthy of being followed up by cultivation on a large scale. However, we still hope at a future day to be able to number rubber amongst our valuable exports, though we must confess that at the present time there is not much to lend encouragement to our aspirations. We need hardly say that however pleased we may all be to welcome the enterprising —though somewhat exaggerating—gentleman from Java (see letter below) there is no chance of his receiving any remuneration for the time and trouble involved in a journey from Batavia to Ceylon for the purpose of teaching us the art of extracting the milk from the rubber tree.

We now proceed to reproduce some of the reports from different planting districts in the island, with which we have been favoured, in answer to our enquiries, and first, from Matale, we learn from the proprietor of Wiharagama estate, as follows :—

"Wiharagama estate has about 25 acres Ceara rubber and specimens of other varieties. Age seven to four years, but principally four years old. No harvesting has been attempted as the trees for the most part are not considered old enough to tap without deterioration, and the older trees are not numerous enough to offer inducement for systematic tapping."

The Manager of Kandanuwara, in the same district, writes :—

"Kandanuwara estate has nine acres, or about 6,000 trees of Ceara India-rubber; growth in years equal five; in robust healthy condition and in a variety of soils. Milking was attempted in 1886 to the extent of about 20 lbs. and gave from ¼ to ½ lb per cooley, but my opinion is that at this early stage of its growth, whatever it may do later on, possibly nothing much greater, it does not pay to grow this variety for rubber. I am told Ceara rubber trees have been found suitable for cacao shade in Dumbara and I have planted cardamoms under them here, but have not found them by any means equal to the natural jungle shade."

We can vouch for the success of Ceara rubber shade for cacao in Dumbara, by what we saw on Pallekelly, where we believe Mr. Vollar has a high opinion of the tree, both for its rapid growth and favourable shade. Mr. Vollar had also made some highly successful experiments in harvesting rubber, to judge by the quantity he was able to gather off individual, trees, without giving much attention to the matter. The rapid growth of the Ceara tree in the Dumbara valley is very remarkable.

From Mr. Charles Gibbon of the Panwila district we have the following report ; but Mr. Gibbon says valuable results should be got during the present month :—

"Goonambil estate has some 15 acres of India rubber. Harvesting tapping has been attempted on two or three occasions, but the result as to quantity did not justify it being continued. The quality of rubber has been very good Experiments will be made in January and February (which will be the best harvesting month probably) and I will communicate them to you. Some of the trees are eight years old, but the larger proportion are half that age."

From Hantanne district, we learn that,—

"Galoya estate has ten acres of Ceara trees of India rubber; growth in years equal four years but the cultivation has been abandoned and weeds allowed to grow. Some of the trees are very fine."

Farther south, we have reports as follows :—

"Ambalawa estate (in Dolosbage) has 30 to 40 acres of the trees of India-rubber, growth in years equal from three to five years old ; growth good I have not tried any regular system of harvesting ; have tapped several trees and found the quantity of rubber insufficient to pay cost of collecting."

Sanquhar estate, Pussellawa, has 11 acres clearing, and also about 500 trees planted here and there about the estate. The 11 acres as four years old having been planted in 1882, the other three a year older. The trees in 11 acres are pretty regular, but have forked rather low. No harvesting has been done, nor has any record been kept of any particular trees growth."

"Kanspediwatte estate, Pussellawa, has about three acres of India rubber, three years old. No harvesting has been attempted owing to the failures of others in obtaining satisfactory results."

Our only report from the high districts, is from Mr. Mackie of Great Western, who wrote :—

"We tried rubber-trees on the Rathnillokelly division of the group four years ago—elevation 4,000 to 1,200ft —only a few came up in the sheltered parts. Some are now 10 to 15 ft high, but I cannot speak of them as a success, I do not know that the cultivation of this tree has been tried much above (say) Nawalapitya on this sides at any rate I have not seen any save our own growing in this part of Dimbula."

"Crossing to Uva, we learn from Mr, Hoseason that—

Kottagodde estate has here and there trees of India-rubber, growth in four years, equal to 15 to 25 ft,, but nothing has been done to them nor are they in any way cultivated, nor is any gum taken from them "

But the most complete report is that for which we are indebted to Mr Philby of Coocoawatte estate, Lunnugalla, as follows.

Coocoawatte, 27th Nov. 1886.

To the Editor of the *Ceylon Observer*,

"Dear Sir,—I now send you a few remarks on the cultivation of rubber on above estate.

Extent—I have 30 acres of Ceara rubber planted from three to five years old ; the growth appears to be satisfactory and there is no apperance of disease.

Wintering.—The trees winter regularly every year about June and July as all the leaves drop off and the tree looks as if it was dead, but in a very short time the young buds appear and the foliage becomes as luxuriant as ever.

Seed.—About the third year the trees begin to flower and bear heavy crops of seed which drop on the gound when ripe and germinate readily,

Harvesting.—I have not yet arrived at any satisfactory process of extracting the rubber. I have succeeded in geting a quarter of a lb. per coolly but this will not pay. There is no doubt that the rubber is there and the question is how to get it? Do the rubber gatherers of Brazil fell the trees before tapping them ; From a tree which had been felled a fortnight or more I got two ounces of rubber in about a quarter of an hour. Passing it in the morning I knocked it about with a big stick, and in the afternoon I found lumps of congealed milk where each blow had fallen and easily picked them off.

Enemies.—Pigs and porcupines are the chief enemies of the rubber tree, and they are very found of the potato like bulbs at the end of the roots However they do not do much harm here, and it takes a good deal to kill a rubber tree when once established.

I should very much like to know at what age it would be considered right to begin tapping and also any known process of extracting the rubber in paying quantities, I annex a table of measurement of trees from one to five years old, some are larger and some are smaller, but these figures represent a fair average of the growth on this estate.—Yours faithfully,

H. MONTAGUE PHILBY."

Table of Measurements of Rubber Trees.

1 Year O d.—18 feet high ; 10 inches round base ; 6½ inches round 6 feet from ground.

2 Years Old.—26 feet high ; branched out 14 feet from ground 22 inches round base ; 14 inches round 6 feet above ground.

3 Years Old.—37 feet high; branched out 15 feet from ground; 30 inches round base; 24 inches round 6 feet from ground.

4 Years Old.—43 feet high, branched out 17 feet from ground 42 inches round base; 25 inches round just under branches.

5 Years Old.—48 feet high, 45 inches round base; branched out 22 feet from ground; 23 inches round just under branches."

H M. P.

We are much obliged to Mr. Philby, and think his trees on Cocoawatte must equal those we saw in Dumbara in size for age. As to the questions asked about Brazil and feeling operations there, we shall have pleasure in sending Mr. Philby a copy of the second edition of our "Rubber Manual" now in the press, in which he will find the latest available information from all parts of the world. Tapping, and also felling and stripping are both practised in South America.

We now turn to the low country of the Western Province and from Kelain Valley we have the following:—

"From Manager Mehalla, Muraloya and Dambuloya. Those estates have neither acres nor trees of India-rubber. I may mention that there are two or three in Mahalla and Muraloya, but nothing is being done to them,

"Pleasure Ground estate has 500 trees (creepers) of Landolphia Kirkell India-rubber, equal four years' growth. These are kept as show trees and are very large, the largest was somewhat destroyed in cutting a thick stem for 'Indian and Colonial Exhibition.' They are being kept to see if they will seed." (But why not send us measurements—Ed., C. O.]

More satisfactory is the following report of his experience at Heneratgoda and Mirigama, by Mr. W. B. Lamont:—

"Having reared about 100 plants of Ceara rubber up to their fifth year, and having given a good deal of attention to them, I arrived through a long course of experiments at the following practical results One-half of the plants turn out useless, either from the inferior quality or small quantity of their yield; that all such trees should be eliminated as soon as their character is ascertained and replaced by others; that no satisfactory result will follow any attempt to obtain produce before the tree is at least four years old; that no system of cutting or piercing the bark will give a satisfactory yield; that it is only in the dry season, when the tree is leafless, and the growth at a stand, that a satisfactory result can be obtained, in the way of harvesting. The plan of obtaining the rubber, that my experiments led up to, was, as soon as the leaves begin to fall, remove the outer bark in vertical strips of not more than two inches wide, and not less than four inches apart. The tender inner bark thus exposed to the sun breaks out, in something like running sores, from which the rubber slowly exudes and drips on the surface as fast as discharged. In this process, the strip of exposed bark is destroyed, but a vigorous tree working from both sides will close in on the bared part in the course of the year, if the width is not more than two inches. Ceara rubber planted at 100 trees per acre will, after the second year, require hardly any expense in cultivation and for the harvesting. I collected 30lbs last January and February, by one boy at 15 cents a day, or say 23 cents per pound, the local value being about 80 cents. Supposing each tree equal to an average yield of one pound per annum, and allowing 30 cents for cultivation and collecting, 50 cents would remain as profit, or Rs. 50 per acre. It is well to have the plant in the island, but it is not likely to be largely planted so long as there are other products that pay better, or that are better understood, but a time may come when it will *kep a strait.*"

"Fifty rupees an acre" is a return not to be despised: indeed we doubt if the average from cocoanuts for all cultivated plantations in the island is so good, and therefore, there ought to be plenty of room for a systematic Ceara rubber industry in Ceylon; but what is the use of speaking of such returns as can be got here if we are to accept the statement of a Java planter (already referred to) conveyed to us by Messrs. J. P. William & Bros, as follows:—

The Editor, Ceylon Observer.

"Dear Sirs,—Many planters from different countries had written us from time to time enquiring as to the best mode of tapping the Ceara Rubber tree, and we are glad to place before the planting community the following letter sent us by a Ceara Rubber planter in Java, dated, 30th November 1886. We shall be happy to give the name and address of the planter in question to gentlemen who may be willing to communicate with him. Newspapers please copy,—Yours obediently."

J. P. William & Bros.

New Product Growers, Seedsmen, &c.,

7th Jan. 1887. Heneratgoda, Ceylon.

Letter referred to:—"From different papers I got the knowledge that the tapping of the Ceara Rubber tree (Manihot Glasiou is very expensive and do not give much results. I now beg to inform you that by my manner of tapping even trees of nearly three years age, by once carving, produce four to five ounces of gutta each, and this manipulation can be repeated every two days during five or six months, without doing any harm to the carved tree, also supposing every tree is carved 15 days a month, about five months, the production of every tree at the end of the five months will be 300 ounces or 25 pounds. Besides that my manner is not expensive, and the production is of the first quality. If the different planters of the Ceara Rubber tree like to be acknowledged with my manner of tapping, I am ready to go to Ceylon in order to show the manipulation, if all costs of transport and staying will be paid by the planters, and a remuneration according to the number of trees of every plantation. As I do not know the planters of Ceara rubber and their number at Ceylon, I cannot apply to each of them directly, and before count on your kind assistance in this affair, being ready to part with you the remuneration the planters should like to give for my manner of carving and tapping the above mentioned trees. Hoping to be favoured with any answer of you."

Messrs. WilliamBros had better tell their correspondent to patent his process for Ceylon, and then come here and lease the Ceara rubber groves already fit for harvesting, while planting on his own account.

"From the southern Province we have two brief reports:—

Hurst Pierpoint estate has five acres or 5000 trees of India rubber equal four years old. Nothing has been done with them and no results can therefore be sent. Trees are growing on bad soil at an elevation of say 30 feet, and are poor and scanty in growth.

"In Udugama districtRubber cultivation has been dropped entirely. I asked some of the neighbours and no one seems to have carried on experiments since Mr. Dobree left the district, and I think he sent you the result and particulars of his experiment.

We trust the above recapitulation of the present stage of the Rubber Planting Industry in our midst will have one good effect, namely, in stirring up our planters to renewed interest in the subject, and to experiments with the trees already available.—*Tropical Agriculturist.*

TABASHEER.

I have often wondered that this curious substance has never attracted more attention. But scanty references to it are to be found in books, and yet it seems to me that few more singular things are to be met with in the vegetable kingdom.

In Watt's Dictionary of Chemistry", (Vol. V., p.653), exactly six lines are devoted to it. It is defined to be "Hydrated silica, occurring in stony concretions in the joints of the bamboo. It resembles hydrophane, and when thrown upon water does not sink till completely saturated therewith." It is further stated to be the least refractive of all known solids, and an analysis by Rost von Tonningen of a specimen from Java gives a composition of 86·39 per-cent. silica soluble in potash, 4·81 potash, 7·63 water, with traces of ferric oxide (to which I suppose its occasional yellowish colour to be due), lime, and organtic matter.

There are several specimens in the Kew Museums, partly derived from the India Museums. All consist of small irregular angular fragments, varying from the size of a pea downwards, and opaque white in colour, It is obvious that these fragments are the *debris* of large masses.

Now, the presence of considerable solid masses of so inert a substance as hydrated silica in the plant-body is a striking fact. At first sight, one might compare it to the masses of calcium phosphate which form the endo-skeleton in the higher animals. These, however serve an obvious mechanical purpose, which cannot be attributed to the lumps of tabasheer in the hollow joints of a bamboo.

The presence of silica may sometimes serve an adaptive purpose, as in the beautiful enamelled surface of canes, And according to Dr. Vines ("Physiology of Plants," p 21), "Struve found that it constitutes 99 per cent, of the dry epidermis of *Calamus Rotang*.*

In a few other groups of plants, such as *Equisetum* and the *Diatomaceæ*, it is a characteristic constituent, In all cases it principally occurs in the cell-wall [Vines, l.c., p, 137], This has suggested the highly ingenious speculation that, seeing the intimate chemical relationship which obtains between silicon and carbon, there might be a silicon-cellulose. I notice that Count Castracane, in his Report on the *Diatomaceæ* collected by the *Challenger*, speaks of its "having been already shown that silica is sometimes substituted for carbon in the formation of cellulose" [P.7] Judging from ash-analyses it might be supposed that silica was an essential constituent of gramineous plants. But by the method of water-culture Sachs has found that maize, for example, will grow with only a trace of silica. I must confess to ignorance of all that may have been done in the matter recently. But Ladenburg thought, and I think with reason, that the indifference of the plant to silica was a strong argument for a silicon cellulose in which silicon might or might not with equal physiological convenience play the part of one or more atoms of carbon. Fascinating as this hypothesis is, I am bound to say that the prolonged investigation which he devoted to the question is on the whole adverse to the idea of silicon playing any part of the kind.

It still remains then an unsolved problem why, when no adaptive end is involved, plants should take up such relatively enormous quantities of silica, The case of the frustules of *Diatomaceæ* is peculiar, as there the siliclous wall is apparently a continuous plate of inorganic matter capable of resisting, without impairment, treatment by the most destructive and disintegrating agencies known. Yet Castracane adduces evidence to show that such walls can grow, and as this can only be by interstitial growth, a molecular constitution is implied, quite different from anything physical, and

* Sachs remarks ("Text book," second edition, p. 700) that silica accumulates chiefly in the tissues exposed to evaporation, though this clearly does not apply to the case of diatoms.

precisely similar to that of a cellulose membrane. He quotes, indeed von Mohl for the opinion that the wall is not simply inorganic, "but only an organic membrane which is impregnated with silex."

Now, in the case of tabasheer, it is quite evident that the plant takes up an amount of silica beyond its powers to use, and so it is exuded into the hollow cavities of the bamboo stem. I do not mind confessing that, in so far as I had reflected on the matter at all, I had pictured to myself this as taking place by some process of secretion, so that the mass of tabasheer ultimately accumulated from successive portions of thrown-off silica. I was obliged however to give a little more serious thought to the matter, when Prof. Cohn, of Breslau, wrote to me that he proposed to investigate the whole subject, and asked for help in the way of specimens and information, it then struck me what a very singular thing the phenomenon of the occurrence of tabasheer really was. I set to work to hunt up in the literature of Indian botany some rational account of the matter. The only ray of light I got was from the "Forest Flora of North-West and Central India,' by Dr. Brandis, late Inspector General of Forests to the Government of India. Everyone who knows Dr, Brandis knows that he gave to administration the energy he would more willingly have devoted to scientific pursuits. I was not at all surprised to find, therefore, modestly hidden in his book (p.566) the key to the riddle. He says "It is not at all impossible that the well-known siliceous deposit (*Tabasheer*) which is found in the joints of this and other species [*Bambusa arundinacea*] may be the residuum of the fluid which often fills the joints." I communicated this to Prof, Cohn and he was good enough to tell me that he quite agreed that this was the correct explanation, I at the same time wrote to Dr King, the distinguished Superintendent of the Royal Botanic Gardens Calcutta, to know if it were possible to procure specimens of tabasheer *in situ*, as we possessed in our Museum nothing but broken fragments. I extract from several letters he has written me, the following particulars :—"January 11. I have inquired of several old workers as to the situation tabasheer occupies. They all say it is found either on the *floor* of the joint, or if (as is so often the case in *B. Tulda*) the stem leans over it is also found on the lower wall. It is never found on the roof of a joint. . . . . Tabasheer is not common in bamboo grown near Calcutta. And besides it is apt to be forced out of its natural position by the force used in breaking a joint open. There is no external mark by which a tabasheer bearing joint can be recognised prior to being opened." January 18. "I have got a specimen of tabasheer *in situ* for you. It concretes *as a jelly*, and is now being carfully dried off."

I think that these extracts (in which the italics are mine) fully confirm the explanation as far as I know, first put out by Dr. Barndis. The rapidity of growth of a bamboo shoot is well known to be enormous. The root-pressure is probably equally great, The joints, at first solid become hollow by the rending apart of the internal tissues,and water containing silica in solution is poured out into the cavities so formed, when the foliage is developed, transpiration is active ; the water taken up from the ground is rapidly got rid of ; not merely is the root-pressure compensated, but the water poured out into the joints is re-absorbed. It is not easy to see why the silica should not be always taken with it, as in the vast majority of cases it no doubt is. But in the cases in which it is left behind it has apparently simply undergone a process of dialysis. The determining causes of the occasional deposit of tabasheer are, I think still obscure. But as Prof. Cohn intends to investigate the subject I think we may pretty confidently look forward to an exhaustive explanation.

It is a well known fact that a large proportion of the ash constituents of plants may have but little significance in their nutrition. The chemical constitution of plants as far as their ash is concerned, to a large extent varies with the nature of the soil in which they are grown. It is quite certain, that they will in consequence take up a vastily larger proportion of certain constituents, then they can turn to any physiological account. Tabasheer is a striking instance of one such case, The calcareous masses found in the wood of many Indian trees mentioned in "Nature." Vol XXI p 378. affords another—W T Thiselton Dyer, in *Nature*.

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VOL. XII.] CALCUTTA :—SATURDAY, APRIL 30, 1887. [No. 18.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 21ST APRIL, 1887.]

Madras.—General prospects fair.

Bombay.—Slight rain in parts of nine districts. Harvesting of *rabi* crops still progressing in some districts. Scarcity of drinking water and fodder continues in parts of Dharwar. Fever and cattle-disease in parts of nine, small-pox in parts of eight, and cholera in parts of three districts.

Bengal.—Rain in many districts has helped ploughing and early sowings. Prospects of Indigo and sugarcane favourable. In Darjeeling tea somewhat injured by hail. *Boro* rice harvest progressing. *Rabi* crops nearly all gathered. *Mahua* being gathered in Chota Nagpore. Public health continues generally fair.

N. W. P. and Oudh.—*Rabi* harvest practically completed. Weather getting hot. Slight rain in a few districts. Sugarcane being irrigated and indigo sowing commenced. Supplies ample. Prices steady. But for cholera and small-pox which are reported from some districts, the public health is good.

Punjab.—Rain has fallen in the Sialkot, Rawul Pindee, Dera Ismal Khan, and Peshawur districts. General health good. Fever prevalent in the Hissar district. Prices falling in the Hissar and Peshawur district, rising in the Rawul Pindee and DeraIsmail Khan districts; elsewhere stationary *Rabi* being harvested, expected yield below average.

Central Provinces.—Cloudy weather has continued throughout the week. The threshing of the *rabi* crops is approaching completion. Prospects unchanged

Burmah.—A few cases of cholera in Akyab town and district, and in Amherst and Thongwa districts; otherwise health of Lower Burmah good. Slight cattle-disease in two districts. Reports received from eight districts of Upper Burmah. Fifty deaths from small-pox in one township of Mandalay district. A few isolated cases in two other districts; otherwise health of people good. Food-supply generally sufficient and prices normal, except in Polnmana, where prices are rising and scarcity of paddy is apprehended. Crop prospects satisfactory.

Assam.—Weather seasonable. Rainfall general, sowing of *ahu* paddy finished, and its prospects are fair *Boro dhan* harvest promises to be an excellent one Prospects generally good. Ploughing and sowing of *dumahi* and *murali* crops continue. Thirty deaths from cholera reported from Kaligara, in Cachar, and a few from Koulpore in Gauhati, otherwise public health good Prices steady.

Mysore and Coorg.—Except in Bangalore and Kolar districts, slight rain is reported throughout the State. Standing crops in good condition, except in parts of the Tumkur district. Prospects of season favourable. In parts of the Kadur district water-supply is reported to be diminishing. Public health good. Small-pox and cattle-disease continue. No material change in prices.

Berar and Hyderabad.—Weather cloudy and close *Rabi* threshing completed. Lands being prepared for *kharif* crops. *Tabi* crops prospering. Reaping of *rabi* crops nearly concluded. Cholera still prevalent in Hyderabad; slight fever and small-pox in places; otherwise public health good. Pric s steady.

Central India States.—Weather cloudy, Rain has fallen generally. Health and prospects good. *Rabi* harvest progressing. Cholera reported in Sutna Bazar: 5 cases, 1 death. Prices fluctuating.

Rajpootana.—Slight showers have fallen in some places, and the weather continues seasonable Tanks and wells continue low generally. Harvesting and threshing of *rabi* crops progressing, nearly finished in some places; outturn anticipated fair. Small pox continues in places, otherwise public health good. Cattle-disease reported in some villages of Todgurh Prices rising in three states, falling in one; and stationary elsewhere.

Nepal.—Weather seasonable. Prospects fair.

Letters to the Editor.

JUBILEE TOBACCO.

TO THE EDITOR.

SIR,—In the issue of the 2nd instant of your journal, there is, in page 176, a selection from "Old Virginia" in *Gardeners' Chronicle*. The article is headed "Tobacco Culture in England", and seems to be something like an advertisement calling upon tobacco growers in the colonies to compete for a prize of £50 offered for "Jubilee Tobacco" by Messrs. W. D. and H. O. Wills.

I believe Indian grown tobacco is entitled to compete for the prize. Rao Bahadoor Bechardas Veharidas, a landed proprietor of Nadiad in the Kaira district (Gujarat), has interested himself in tobacco culture. He has grown and cured indigenous and Virginian tobacco, and is anxious to compete for the prize. I shall therefore be obliged if you will kindly furnish me with all the conditions on which the prize is to be competed for. In case no further information beyond that contained in the article is available in your office, I hope you will suggest the course I might adopt to get at the required information.

VAIKUNTHRANATH,
At. Asst. Director of Agriculture.

Poona, April 18, 1887.

NOTE.—We regret our inability to furnish any further information than that contained in the article referred to, but we believe that Indian-grown tobacco will be eligible for competition for the prize. We would suggest a reference to Messrs W. D. and H O. Wills on the subject of terms and conditions. The prize offered is "for the best crop grown in the colonies this season", and the inference we draw from the article is, that it must be a crop of one acre of land.—ED., *I.A.*

Editorial Notes.

WE reproduce in another column a sensible article from a native contemporary on the subject of the Government Agricultural Scholarships, which have now been suspended, and commend to the attention of the authorities the suggestion thrown out for the utilization of these scholarships in the manner proposed by our contemporary. The subject is worth considering.

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THE Lahore Veterinary College, a correspondent writes, "is to suffer under the present Financial policy. The assistant professor, a man of several years' practical experience in the Stud department, on Rs. 250 per mensem, is to be placed on the retired list at once, as under financial pressure, Government does not see its way to giving him an enhanced salary. But his place is to be filled by a young Veterinary Surgeon from England on a higher salary, and who will take some time to acquire a sufficient knowledge of the vernacular to be able to lecture in it." This is how the Government usually introduces economies; and is characterestic of its "penny-wise-and-pound-foolish policy.

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WE are glad to see a protest in the *Indian Forester* against the wanton destruction of valuable forests in Native territory near Mussoorie. The Forest Department is powerless to arrest these ruthless denudations of timber, which, in the majority of cases, are resorted to for the sake of obtaining a few rupees by the sale of charcoal. The Tehri Rajah, near Mussoorie, the writer says, has utterly distroyed fifty miles of forest—"the most beautiful Oak forest I ever saw," he adds pathetically. What makes matters worse is that this kind

of destruction takes place on lands adjoining British territory, without the authorities being able to interfere. May we ask whether there is no sort of remedy against such vandalism ?

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THERE is trouble looming in the distance for the growers of sugarcane and beet-root for the manufacture of sugar. According to an American journal sugar can now be made from "any *description of vegetable* fibre, such as saw-dust, rags, or tow. *The process is to digest for* several hours in sulphuric acid : then to dilute the mixture with water, and to boil for some time, when the rags, or what-not, will be found to have undergone a magical change, and to have been converted into sugar. A curious fact is, that 100 parts of rags will yield 115 parts sugar, the increase of weight being due to the elements of water absorbed during the change." We have serious thoughts of making a fortune and retiring into private life, by going in for the sugar business ourselves.

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THE Kulu correspondent of a contemporary writes :—"As for crop prospects, the barley in the lower valley has suffered much from the deficient rainfall, and will probably not yield more than a 6, or 7-anna crop. In the upper valley, where the harvest is much later, it will be better. The various field peas have also suffered, they are all stalk and leaf, with comparatively few flowers. The wheat has not suffered to any great extent, and should all go well during the next month will yield a 13 or 14-anna crop. Poppy and tobacco also look well. Some of the hill tobacco is very fine flavoured, and would, if properly cured, prove much better than the Pusa, or any other of the plain tobaccos. The soil and climate being so much superior, I wonder that no one has tried the experiment."

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FROM reports received from the Indigo districts we gather that in Bengal prospects continue very good, the weather, with some good showers of rain, being all that could be wanted, and bringing on the plant well. The spring sowings are now completed. The accounts from Behar are not altogether so favourable, although a good fall of rain has been general, which has been of great benefit to the plant, especially in Chumparan, where the prospects up to the present time were not favourable. In other districts, such as Chuppra, parts of Tirhoot, and especially the neighbourhood of Muzaffarpore, caterpillars had damaged the plants, while the cold nights have retarded their growth, and the late heavy rain has done considerable damage to the last sowings ; so that a large area of land has had to be re-drilled. Altogether, however, the plant throughout Tirhoot is not looking so well as usual, and is very thin in some places. In Benares the weather has been most favourable, and the sowings are all reported as doing well.

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A FEW invoices of new season's tea have been received here, chiefly from the Doars, and some 200 chests have, we learn, been sold privately for London at an average of 8 annas and three pie per lb. The quality was fair, but better than that of the first parcels of last season. Some musters from other districts are also coming in ; those from first pluckings in Assam and Cachar are reported to be a little better than those of last year. The musters from the Dooars and Darjeeling made from later leaf, show in many cases excellent quality. The weather has been generally favourable both for growth and manufacture, and the out-turn is ahead of that of last season ; but during the last week the weather at Darjeeling, we are told, has been very cold, and serious damage has been done to some gardens, especially around Kurseong, by hailstones. During the last two days reports had also been received of hailstorms in Sylhet. The first public sales of the season will probably be held on the 12th, or 19th of May.

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We have received the following report of the tea crop of India for 1887, from the Indian Tea Association :—

In their Circular of the 3rd of March, the General Committee published figures showing the revised estimate of the Indian Tea Crop of 1886, to have been 74,489,579 lbs., while the actual out turn was 79,098,243 lbs, against the outturn of 1885, of 68,730,219 lbs. The Committee have now the pleasure to hand you the following Estimate of the Crop of 1887, taken from figures which they have been able to collect and from other sources :—

	Estimated outturn of Crop of 1887. lbs.
Assam	35,903,520
Cachar and Sylhet	27,631,100
Darjeeling Terai, and Doars	14,703,300
Chittagong and Chota-Nagpore	1,544,000
Dehra Doon, Kumaon, and Kangra	3,750,000
Private and Native Gardens (*Estimated*) ...	1,500,000
Total	85,031,920

The exports to Australia, America, and other places (principally Bombay and Madras), during the past season have amounted to 2,725,000 lbs., and if this quantity, together with the requirements of the Government and the local consumption of Northern India, calculated at 1,500,000 lbs, be deducted from the estimate, there will remain 80¾ million pounds for shipment to Great Britain during the season of 1887.

The annual out-turn of Indian tea is increasing steadily every year.

THE following is a summary of Messrs. Gow, Wilson & Stanton's Indian, Ceylon, and Java Tea Report, dated London, April 1st, 1887 :—Since our last (dated 18th ultimo.) 28,192 packages of Indian, 5,310 packages Ceylon, and 2,320 packages, Java, total 35,822 packages have been offered by public auction. There has been a decidedly better enquiry for all sorts. As supplies have been brought forward in very limited quantities; the bidding was brisk and prices tended upwards. All except low "brokens" and poor liquoring teas show an advance of fully ½d. per pound, while fine and tippy teas have changed hands at as much as 3d. per pound better value. Many "*closing invoices*" have been disposed of, and now that the surplus over last season's crop has practically disappeared, the available supply is in no way in excess of our requirements. A reference to the table of comparative values will show that the level of prices still continues far below that of recent years.

As an idea of the current prices of Indian Tea in London, we quote :—

Fannings	5¼d.	same time last	year	9d.	and	8d.	in 1885,
Broken Tea	6½d.	,,	,,	10d.	,,	9d.	,,
Pek. Soug.	8¾d.	,,	,,	10¾d.	,,	10½d.	,,
Pekoe.	10¼d.	,,	,,	1/0¼	,,	1/0½	,,
Pek Soug.	6¾d.						
Pekoe.	8½d.						

Ceylon descriptions have participated in the improved prices ruling for Indian Tea, and have sold freely at slightly enhanced rates. The quality from several estates continues very disappointing, but a fair proportion of the offerings shows improvement especially from gardens of high altitude.. The 3,579 packages sold during the first week averaged 1·1, and the 1,731 packages sold during the second week 1·0½. The average for the fortnight was 1·0¾ per lb. The quality of the 2,320 packages of Java Tea brought to auction, although as a rule poor, is about on a par with that of arrivals usually taking place at this season of the year. The market has exhibited no material change, but the tone is generally firm, the demand both for shipping and the home trade being well maintained. An invoice just sold from "Bageleu," comprised some very fair liquoring Teas. The 2,320 packages sold at an average of 7¾d. per lb.

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IN the Southern States of America the use of Rhea and Jute fibres for the manufacture of paper is at present attracting considerable attention. An American exchange says : ' It is an indisputable fact that these fibres are the *ne plus ultra* for paper-makers, that the only question is that of cleaning and bleeching the fibre, when there will be before them the very fibre they want, in inexhaustible supply. We are earnest about this matter, because we see in it the release from the uncertainties and difficulties of the wood pulp question. We want to serve both the paper-maker and the Southern grower; hence if either will write information, we will put them in communication with the other, with ultimate benefit to both, and the

feeling in our internals that we have performed a duty we owe to both." As we also wish to "feel in our internals that we have performed a duty," we bring this matter to the notice of both paper-makers and growers of Rhea and Jute in this country.

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We were not very far out when we made such an unfavourable comparison between the inducements held out to intending candidates for the Indian Forest Service, and the enormous cost of education, and the severe mental and physical tests required before a candidate can even hope for admission into the service, leave alone the wretched salary offered to start upon. A Southern India contemporary, in noticing the impending changes in the Forest Department in the Malabar district, says: "We regret to hear that Mr. Rhodes Morgan has been suffering from dropsy of the heart, (the result of continued attacks of jungle fever) and that his recent short leave up here has been of little benefit to his health. We believe he has left this with the intention of availing himself of furlough to Europe, under medical advice, and trust the change will restore his shattered health. The Forest Department is one in which few men can escape material damage to their constitutions for any length of time, and we can quite endorse all that the *Indian Agriculturist* lately said on the subject; the marvel is that any man can be obtained to accept forest appointments with the miserable pay offered, and the excessively hard work and deadly risks they run."

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A correspondent of the *Indian Forester* mentions a formidable forest pest in the shape of a 'tick' (a species of *Acarus*). He says:" In the forests of the Dhoon and Bijnoor districts, I have never met with this insect; but as you go further southeast, it gradually gets worse, till it seems to culminate in the Gorakhpore district. There you cannot walk in the forest without getting numbers on you. You cannot feel it crawling on your skin, and it gets its forceps deep into your flesh before you are aware of its presence, and when removed, it tears away skin and flesh, and you feel the pain for weeks afterwards. I heard of two circumstances that will illustrate what has been said, and show what this little pest can do. One of the forest guards shot a Cheetal one day, and as he could not get any one to help him to carry it, he carried it himself on his shoulders. The ticks left the dead animal after it got cold, and attached themselves to the man. He had them picked off, but there were so many of them, and the sores got so bad, that he was laid up for a month. In the late 'sleeper' operations in this district, it was intended at first to saw up the trees in the place where they were felled, so as to save expense; but after the sawyers had been at work three days, they found they could not lift their arms, the pain was so great from the removal of the vast numbers of ticks that had stuck to them. There was nothing for it, but to cart out the the trees to depôts in the open. The fellers of the trees were used to the forest, but the sawyers, drawn from all parts and working longer in one place, could not take such care of themselves; and so the ticks upset the working plans, and greatly increased the expenditure."

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The use of boracic acid as a preservative of fish has been discussed in these columns. It will be remembered that some doubts were entertained as to its general use on a large scale, it having been asserted that it acted injuriously on the human system if taken in any quantity We now learn, that experiments which have recently been made by Dr. Johnson, of Stockholm, tend to disprove this allegation. Large doses of borax (20 to 50 grains) were found to be quickly eliminated by the kidneys, and other excretory organs, the excretion beginning in about ten minutes after administration. The same applies to boracic acid. Afer ten days' administration of the large doses various depressing symptoms were observed, such as headache, loss of appetite, bronchial catarrh, and even papular eruptions of the skin. Nevertheless, Dr. Johnson does not feel justified in condemning the use of the substances as antiseptics, for these symptoms were produced by extremely large quantities, such as are not likely to be taken in food without decided repugnance to the taste, which, it must be admitted, is the guiding factor in the selection of food.

The cultivation of Vanilla appears to have been attended with considerable success in Ceylon. The *Tropical Agriculturist* writes:--" Mr W. H. Wright's culture of Vanilla—an orchid be it remembered—is likely to be most successful. On his two brick-work circles of trellis work at Wilhelmsruhe, Mr. Wright has up to date artificially fertilised no less than 3,000 flowers. He is also trying experiments with gum arabic and with ants in modes of fructification. It must be remembered that to Mr. Wright—in the old Peradeniya days of 30 years ago—belongs the credit of being perhaps the first in Ceylon to cultivate Vanilla for the European market. Some pods sent by Mr. Wright to an Exhibition, in Sir Henry Ward's time, were valued at 5 guineas the pound. [A portion of the same Vaulla was sold at that rate in London through Messrs Baring Brothers]. On that occasion the Committee, [Messrs. Rawdon-Power, Layard, &c,) red-tape-like, decided that Mr. Wright's small assortment could not be sent on. So also said other *big-wig* officials when applied to. Mr. Wright asked to see the Governor: Mr. John Bailey and others in attendance said,: "Impossible—Sir Henry is deeply engaged with the mail." But Mr. Wright persisted and finally got an interview, with the result that,like the hearty, manly, English gentleman he was, Sir Henry entered into the Peradeniya Assistant's experiment with the greatest interest. Stop the mail! was theGovernor's cry—but it was too late. "Well, then, prepare a runner-express at once," was the order, and all this for Mr Wright's Vanilla! No wonder, though, Sir Henry Ward endeared himself at every turn in his Government of Ceylon—Mr. Wright's experiment at Wilhelmsruhe is merely preliminary to cultivation at Mirigame, where 10 acres are being devoted to Vanilla—Dr. Triman has pronounced Mr. Wright's garden Vanilla the finest he has ever seen."

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The following experiment in the germination of *Babul* seeds was carried out by an officer of the Forest Department in the Sholapore district of the Deccan, and is interesting, as throwing light on the germinating power of these seeds:—"Orders were given in February 1886, to allow goats to graze and obtain Babul pods and seeds for a limited time in a reserve where babul was plentiful, and to fold them at night in another part of the reserve, where the ground was absolutely bare of any vegetation. The experiment was commenced by my predecessor just before giving over charge to me, and the spot chosen being in a remote part of the district, and difficult of access, I was unable to observe the progress of the experiment personally. At the present time, however, there is in the place where the animals were folded a fair crop of young seedlings, averaging some three to four inches in height. The Range Forest officer of the Taluka reports, as the results of his observations, that most of these seedlings have sprung from seeds fallen or ejected from the animals' mouths, but that undoubtedly some of them have come from seeds that have passed through the stomach of the animals and been voided in their droppings. This of course proves but little, *viz.*, that some seeds are voided and germinate; but by further experiments and personal observations and precautions, I shall attempt this year to obtain more precise information as to the greater adaptability,or otherwise, for germination of seed that has had such treatment.

One of our local 'dailies' is rather given to the discovery of Mare's nests.' A few days ago it came out with the following astounding statement in its leading columns:—"It is our firm belief, that if the Government looked properly into the sale and consumption of salt in Calcutta and its environs, the revenue would receive such an accession that the income-tax might be abolished. Formerly the storage and sale of salt in Calcutta was supervised by a special department under the Commissioner of Police. This department was abolished in 1866, the duties performed by it devolved on the regular police, and it was, we presume, left on record that after the lapse of a few years, an enquiry should be made as to whether the change had been attended with good or evil results. If the Government would take the trouble to enquire how much salt was sold and consumed in Calcutta in 1864, and compare it with the quantity now known to be sold or consumed therein, it would at once understand the real state of affairs." Now, the income-tax is

calculated to yield from 120 to 130 lakhs a year, and the population of Calcutta and its envirous may be taken at 600,000. persons. Every man, women and child, therefore, of these six-hundred thousand persons must be supposed to consume so vast a quantity of salt that duty thereon "if properly levied" would amount to Rs. 20 per head, or say 10 maunds (820 lbs.) of salt per annum. The normal consumption meanwhile, for a well-to-do population, is supposed to be 15 lbs. to 18lbs. per head.

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In a later issue we find a correspondent of the same journal writing as follows on a new method of ploughing the land, which he appears to think might be generally adopted with advantage:—"I have received information from a reliable source to the effect that a public lecturer some time ago stated that the advantages of deep ploughing were so striking that he believed it would be profitable in some cases to cultivate the ground by gunpowder in the following way: Let holes a yard deep and an inch in diameter be made in a field three yards apart from each and other, and filled with gunpowder; then let them be fired simultaneously, and all the benefits of deep ploughing would be secured. The lecturer apparently made this remark half in jest and half in earnest, But it is a perfectly correct idea—provided only gunpowder were cheaper than it is."

After this, who will question the possession of inventive genius of an exalted order by the people of India? [The writer quoted discoursed on the Patent laws of India.]

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DRUMINE is the name of a new anæsthetic, being an alkaloid obtained from the *Euphorbia Drummondii*, an insignificant weed found in South Australia The *Chemist and Druggist* writes as follows on the subject:—"Our latet advices from Australia show that drumine, the "alkaloid" of *Euphorbia Drummondii*, which is reported to be a powerful local anæsthetic and a rival of cocaine, is receiving close attention. The plant is a low insignificant weed, with inconspicuous flowers and fruit. The leaves are ovate, but occasionally ab-ovate, and in some cases the stalks and lower surfaces of the leaves are purplish. It is easily distinguishable from other weeds which resemble it in outward appearance, by its milky juice. The plant has a local repute in New South Wales for its poisonous effects on sheep, which eat it along with other green food. Dr. Reid explains in a letter to the *Chemist and Druggist of Australasia*, how he was prompted to make the experiments which culminated in the discovery of drumine. He was asked for an antidote by a farmer, who had lost stock, which had eaten a poisonous herb. He determined to investigate the properties of the herb, with this end in view, and obtained a supply of the plant. He submitted it for identification to Dr. Schomburgk, of the Botanic Department, Adelaide, who described it as one of the most poisonous plants of South Australia—a spurge-weed (*Euphorbia Drummondii*), and added that a large number of sheep and cattle are annually killed by eating it. The effect of the plant upon the animals is to produce hoven, due to the drumine paralysing the sensory nerves of the stomach, and thus stopping digestion. It is a remarkable fact, however, that Mr. Edward Stanley, Government Veterinarian of New South Wales, made an investigation last year into the matter, and failed from experiment to get any satisfactory proof that the plant causes hoven. It is probable, however, that Mr. Stanley was working with a plant similar to, but not identical with, the sponge-weed."

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THE following method of raising bamboos from seed, and planting, is described by a correspondent of the *Indian Forester*, and appears so simple, while at the same time efficient, that it ought to recommend itself to forest officers generally throughout the country:—"I was shown the other day in the Ramgarh Division of the Gorakhpore Forest, some clumps of bomboo raised from seed that seemed to me to have done extra well, and as I have not seen this system of sowing and planting adopted with these, described, it may be useful to some to know it. Earthern *Gharras* are cheap in the Gorakhpore district—100 can be purchased for a rupee. These are taken, and five small holes for drainage purposes are made in the bottom, they are then filled with good soil and from eight to ten seeds sown in them. This is done in the beginning of spring. The *Gharras* are then placed on the ground close together and earth filled in around them; They should be near a well for convenience of watering, which is done regularly. When the rains commence, the *Gharras* containing the seedlings are taken in *banghees* to the place where they are to be planted; holes three feet in diameter and three feet deep having been previously dug, and filled with a mixture of earth and leaf-mould. The *gharra* is placed on this earth with the top well above the surface of the ground; It is then broken and removed, and the earth pressed round the mass of fibrous roots that the ball of earth contains; no more attention is given to them, and by the end of the rains the shoots are well up. Measurements were not taken, but when removed for planting they were some 2 feet high, and at the end of the rains double this height. Now when they are five years old from seed they are fully established, and have culms 50 to 60 feet high, looking almost as well as clumps that were planted 13 years ago. The kind of bamboo planted is called by the natives Kat-bans (*Dendrocalamus strictus ?*)".

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Kuhlow's Review tells us that the German Consul at Saigon, has just sent home to the Commercial Museum at Frankfort, an elaborate collection of the export commodities of Cochin China; with an exhaustive account of the import and export trade. The articles he sends, dried and pressed buffalo skins, buffalo horns fish and cocoanut-oil, india-rubber goods, fish bladders, pepper, lacquer, cocoons, silk, refined cotton, &c. &c., are all minutely described in the report; prices, purchase conditions, export quantities, shipping opportunities, &c., also being fully gone into. In fact, Consul Speidel has left no stone unturned in his praise-worthy endeavour to lay before his countrymen the most minute particulars of the export trade of the country, so that they can see for themselves at a glance, whether it would benefit them to procure from Cochin China any of the commodities they now obtain from other remote lands.

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THE modern fancy, for such we fear it is, that the variation of the rainfall of the globe is a response to those changes in the sun's condition, which we know best by the variation in the magnitude and frequency of the spots on its surface,—has been familiar for some years to all who are interested in meteorological inquiries. It was in 1872 that Mr. MELDRUM communicated to the British Association his discovery that the cyclones of the South Indian Ocean were subject to periodical variation, and that Mr. NORMAN LOCKYER drew public attention to the fact that the rainfall of Madras, appeared to vary in like manner. Mr. BLANFORD, Dr. HUNTER, and others have since taken up this fancy, and supposed that they found confirmation of the belief, in the rainfall of the various provinces of India. Their reasonings are vitiated by a flaw so obvious, that we have long wondered it has not been pointed out. If these sunspots have any influence whatever upon our atmosphere, the influence cannot possibly be confined to India. And yet we have never seen a speculation upon the subject, the data of which reached beyond the Himalayan hills in one direction and Ceylon at the other. If the sun-spots affect the hydrometric condition of our atmosphere, it must in the nature of things, be a world-wide influence, and to build any conclusion whatever upon the atmospheric condition of India, seems to ourselves almost puerile. Observations in the Sahara desert, the far west of America, China, may lead to diametrically opposite conclusions to those deduced from Indian data.

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THE report just issued by Mr. Finucane on the estimated out-turn of the Bengal wheat crop for the season 1886-87 is encouraging. The approximate nominal area under this cereal is 1,134,900 acres, of which the major portion is confined to the Patna and Shahabad districts, of the Patna division, and to the Bhagulpore and Monghyr districts of the Bhagulpore division. Although excessive rain during September and October last retarded sowings in time, and brought on rust, the area sown exceeded the 'normal' from 5 to 25 per cent

in five districts, was normal in four districts, and fell short of it in seven districts from 8 to 25 per cent. The expected outturn is also satisfactory. Taking sixteen annas to mean a fair average crop, the outturn in the four districts of Durbhunga, Malda, and Hazaribagh is estimated at 16 to 18 annas; in three districts it is the average, and in the remaining nine, varies from 12 to 14 annas. These estimates are based upon reports received by district officers from European indigo planters, managers of Wards and Government estates, selected zemindars and others; and though they lay no claim to statistical accuracy, great trouble had been taken in their preparation by those who furnished them; and they are believed by Mr. Finucane to be, on the whole, fairly trust-worthy. This is the first time that anything of the kind has been attempted for Bengal, and there is no doubt that in time these estimates will become nearly as reliable as those for the N.-W. Provinces. The absence of a cadastral survey and maps, and a record of rights, is a serious drawback to the compilation of such statistics with any degree of accuracy; but the introduction of the *putwari* and *kanoongo* system of village surveys will do much to assist the Agricultural Department of Bengal in these matters.

THE system upon which the wheat trade of India is carried on stands condemned upon the showing of the exporters themselves, at any rate upon the arguments used by "A Calcutta Exporter" in the columns of the *Pioneer*. This gentleman has seen fit to address a second letter to that journal in order to "explain certain points" upon which he has been "misunderstood," and "to strengthen such of his previous statements as might appear to rest rather on assertion than proof." Our contemporary has commented upon this letter in the following terms:—

Our correspondent had expressed a doubt in his former letter whether the dirtying of the wheat did not actually tend to an increased trade. We thought it somewhat marvellous that the success of Indian wheat should be due to the fact that it is partly not wheat at all, but *omne ignotum pro magnifico*: to the Calcutta exporter the miracle is simple. The preference shown by the home trade for dirty wheat arises, we are now told, from the circumstance that they stand on the same relation to the Calcutta exporters as the latter do to the up-country dealers, and under the present system of refraction sometimes get clean wheat which they do not pay for. Now, we never disputed that London importers might make gain to which they had no title, as well as Calcutta merchants; but we certainly have always wondered that for the sake of a chance profit exporters and importers should be willing to perpetuate a system which admittedly leads to the substitution of inferior and dirty wheat for high class wheat in the Indian export trade, and which makes merchants pay freight for an annual shipment of thousands of tons of dirt. "A Calcutta Exporter" misinterprets the phenomena of the trade altogether, in supposing that it has in any way been fostered by the system of sticks and dirt. The volume of exports would not have been less—we might safely guess, it would have been greater, since no freight on dirt would have been added to the price, and the repute of the grain would have increased—than now, had merchants, dealers, and cultivators never got it into their heads that by excessive sharpness they might make more profit than their neighbours by the present system. All that the system has done is to ensure that the shipment of dirt shall increase annually in a certain proportion to the total volume of wheat exported. The question does not concern the special quality of wheat, but whether or not the quality that suites the market best is to be adulterated and dirtied. To contend that it finds a more extended market on that account, is to rival sophistication in trade with sophistry in argument.

We are at one with our contemporary in this matter; and reproduce elsewhere "A Calcutta Exporter's" letter to show the shallowness of his arguments.

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OUR Bombay contemporary, the *Times of India*, condemns the refraction system in no measured terms, and finds no extenuating circumstances for keeping alive the fraud that English importers positively prefer to buy Indian wheat adulterated and in a dirty condition. "As a fact," writes our contemporary, "Indian wheat is not placed on the London market in anything like the state of purity that might be attained. Presumably, therefore, English buyers are in ignorance as to its real qualities, and thus the article is to a certain extent discredited and placed at a disadvantage as compared with American wheat. To remedy this, the whole trade must be thoroughly reformed. Nothing can justify the shipping to England of any article of commerce containing a heavy percentage of mud and rubbish deliberately introduced. It is patently absurd to say that the English buyers insist on this admixture. By all the laws of arithmetic, it is the same thing to them if they only pay on 95 per cent., the unadulterated proportion of the present article, so that the wheat should reach them in the pure state, or in as pure a state as possible. Indian wheat would then take its proper place in the European markets. It certainly seems to lie chiefly with the exporters to give it this position. Their present relations with the Native middlemen must be altered."

The discovery made by Mr. Smeaton of the practice of adulterating pure fresh wheat with old grain *unfit for human food*, is supplemented by another somewhat similar case, also on the Bombay side, for our contemporary writes: "It is abundantly clear that there is great mutual distrust between the up-country dealers and the shippers, and that constant efforts are being put forward on both sides to over-reach each other. To the general public the all-important consideration is that the wheat of India leaves the country in a most discreditable state of impurity. In this connection we may supplement Mr. Smeaton's arguments by a fact recently brought to light by an expert in Bombay in regard to the very fine wheat known as white *dessi*, grown in the Nurbudda Valley and Chattisgarh. When this wheat leaves the cultivator it is pure to the extent of 96 per cent., and if shipped in this condition, it would undoubtedly take a foremost place at home. But the European export houses in Bombay contract with the Native dealers for something other than the pure article, with the result that this wheat leaves for England pure only to the extent of 80 per cent., with 16 per cent. of inferior qualities of grain, straw, peas and chaff, and 4 per cent. of pure mud *deliberately* mixed with it. Such a system of trade must be rotten to the core."

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WHILE on this subject it may be as well to quote English opinion on the wheat trade of this country as contrasted with America. The writer of the city article in a recent issue of the *World* says:

A Swiss professor has lately published an interesting paper on the competition of India in the wheat market. His work is very painstaking and instructive; we propose here to glance at some of his conclusions, since they are of great interest to the community generally, and to farmers more especially. The professor estimates the cost of the production of wheat in India at 10*s*. 11*d*. per quarter—calculating the rupee at 1*s*. 6*d*.—under average conditions; transport to a railway—average distance 30 to 35 miles—2*s*. 3*d*. per quarter; expenses at the station, 1*s*. 1*d*.—the estimate of the Bombay Chamber of Commerce; railway freight to the seaboard, 5*s* d½. 6; charges at the port of shipment, 1s. 10½*d*. and sea freight 5*s*: total, 26*s*. 8*d*. per quarter—or adding insurance, &c., 29*s*, to 30*s*. In London. It is instructive to compare this estimate with that of America, where farming properties are larger, where machines are extensively employed, and railway facilities far more developed, though labour is, of course, much dearer. Our authority calculates the cost of production and carriage to the railway of American wheat at sixty cents, or 2s 6d, a bushel, so that at the railway Indian wheat is about forty per cent cheaper. Making due allowance for the lower rates of railway and ocean freights from the United States, the average cost of American wheat at Liverpool is 3s. 42/5d. per bushel. Against 2s. 11 13 16d. per bushel for Indian wheat America is thus most heavily handicapped at present, but she bids fair to be far more so in the future, unless the currency question be quickly solved by the restoration of silver. In America, the cultivation of wheat is already fostered on the most economical and scientific principles; whereas in India it can be perfected, more railways can be constructed, and above all, the value of the rupee may fall below 1*s*. 6*d*., in which case a fall of every penny would make Indian wheat 1*s*. 2½*d*. per quarter cheaper in England. This is

bad enough news for the Western States of America, which are already suffering so much that in Dacota the payment of six months' taxes has been remitted till better times; but it is worse news for our own farmers, who are so hopelessly struggling with competition and fencing with bankruptcy. It behoves then our landowners and agriculturists to appreciate the stern logic of facts, to cease to temporise, and so wrestle intelligently with the evils by which they are oppressed. Would that they could as a body be induced to seek a remedy in bi-metallism, and be brought to nourish in their minds the undoubted truth that their prosperity—nay, their very solvency—is indissolubly linked with a satisfactory solution of the silver problem!

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THE following is the Official Summary of the reports on the state of the season and prospects of the crops for the week ending 21st April, 1887:—Slight rain has fallen generally in most parts of Madras, Bombay, Mysore, Bengal, and Assam, and showers are also reported from a few places in the North-Western Provinces and Oudh, the Punjab, Central Provinces, Central India and Rajpootana. In Burmah there was general rain during the week ending the 9th instant, but during the week ending the 10th idem the falls were confined to a few districts in Lower Burmah only. The *rabi* crops have been nearly gathered in all Provinces, and threshing operations are now in general progress. Prospects show no improvement in the Punjab, where the harvest, which is advancing, is anticipated to yield below the average. Preparations for the *khariff* have begun in parts of Bombay, the Central Provinces, and Berar, where the land is being ploughed. Except that the crops need rain in one or two districts, agricultural prospects in the Madras Presidency are fair. In Mysore and Coorg the out-look continues satisfactory. The spring rice harvest is progressing in Bengal and Assam, and promises to yield excellently in Sylhet. Low-land paddy is being sown in Bengal and the *ahu* paddy coming up well in Assam. Sugar-cane is doing well in Bengal, the North-Western Provinces and Oudh, and the Central Provinces; it is being planted in Bombay and is being harvested in Madras. Cotton-picking is in progress in Madras and Bombay. Indigo-sowing has commenced in the North-Western Provinces and Oudh, and the crop promises favourably in Bengal. The public health is generally satisfactory in all Provinces. Cattle-disease is chiefly prevalent in Madras and Bombay. Prices are fluctuating in the Punjab; elsewhere they are generally stationary.

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IN the last number of the *American Agriculturist* to hand, there is a fine illustration and an interesting account of a plant that has received the name of the "Cruel Plant." It has been botanically recognised as *physianthus albens*, but is now called *Araujia albens* in Bentham's *Genera Plantarum*. It belongs to the Natural order *Asclepiadaceæ* (the milk-weed order), and is a native of Buenos Ayres, whence it was introduced into England so far back as 1836, but did not attract any special attention at the time. Being a climber and bearing, pretty white flowers with a sweet Jasmine-like scent, it was merely regarded as a hot-house climber and nothing else. The *American Agriculturist*, however, states that it is a veritable insect-catcher, and describes a peculiar process in the arrangement of the stamens and pistils whereby any winged insect lighting upon the flower and inserting its proboscis to suck the nectar, is instantly caught there, to remain and perish of sheer starvation. That upon a trellis work covered with this plant in bloom, scores of butterflies and other winged insects may be seen hopelessly transfixed. Owing to this peculiarity it has been named by the Editor of the journal, to which we are indebted for this information, the "cruel plant." It occurred to us that being a native of Buenos Ayres, the plant would grow to perfection in this country, and prove an acquisition to an Indian garden, not only for the beauty and fragrance of its flowers, but as a natural agent in the destruction of garden pests which owe their origin to winged insects. We accordingly addressed the Secretary to the local Agri-Horticultural Society, asking if such a plant found a place in the Society's Garden, and were answered in the negative. We then asked Dr. G. King, Superintendent of the Royal Botanical Gardens, Seebpore, and received the same reply from him. It would therefore seem that the plant is not in existence in this part of India. We shall be glad to hear from some of our readers if they have come across the plant in any other part of India. It is unquestionably a valuable plant so far as its insect-killing character is concerned, and if it does not exist in the country, is well worth introducing. This hint might be taken by some of our Agri-horticultural Societies and Government Gardens.

WE have been anxiously looking out for the last Annual Report of the Bombay Agricultural Department, but hitherto it has not put in an appearance. Some of the daily papers have been quoting the Resolution of the Bombay Government upon Mr. Ozanne's report, and this is what it says:—"Mr. Ozanne includes in his report a very complete summary and review of crop experiments conducted at the Government farms at Bhadgaon and Hyderabad during the year. One of the most instructive experiments made at the former farm showed that on the partial failure of a cotton crop, the interculture of rabi crops, especially gram, with the cotton is much superior to the local practice of ploughing up the cotton, altogether and substituting another crop. Another useful experiment showed the extreme difficulty of substituting in any locality one distinct kind of wheat for another, such as, a soft for a hard; and Mr. Ozanne has consequently come to the conclusion that, instead of trying to improve local varieties of wheat, efforts can be more usefully directed towards improving the present method of preparing wheat for the market, and preventing the mixture of dirt now so general. A steam wheat-thresher has been tried with great success; and the prospect of the formation of a company to import these machines and work them for hire may be considered as very satisfactory. The subject of manures engaged Mr. Ozanne's special attention during the year. The importance of bone manures in India is shown succinctly in a quotation from a report by Mr. Woodrow, of the College of Science Farm, where successful experiments with a bone-crushing mill have been made. Experiments with cow-dung, and cow-dung ashes have shown clearly that, though the former is much superior in the long run, the ashes, nevertheless form a far too valuable manure to be recklessly wasted as is now unfortunately the practice in some parts of the country."

SOME idea of the way in which Forestry is carried on in South Australia, and the profitable nature of the industry, may be gathered from the following telegraphic summary recently sent by the Adelaide correspondent of the Melborne *Argus* to that journal:—

Mr. Walter Maddan, M. L. A., the vice-chairman of the Victoria Commission on Vegetable Products, and the other four members who are with him in this colony, returned from visiting the Bandaleer State forest, 150 miles north of Adelaide, and 40 miles east of Point Paris, co-operating with Mr. J. L. Dow, the Minister of Lands. The commissions are giving special attention to the subject of foresty in South Australia, and information has been obtained which will be of great value in the contemplated Victorian legislation. Mr. J. E Brown, F. L. S, the Conservator of Forests, accompanied the party and gave evidence of a very valuable character, which was taken down by Mr. Bell, the Government short-hand-writer. The commissioners were astounded at the results obtained in a colony much less favourable for forestry than Victoria. At Bandaleer the sugar-gum and blue-gum trees, nine years old, average 30ft. high, with stems averaging 10in. in thickness, some reaching 65ft high and 2ft in girth. The area planted in this forest is 2,500 acres, bearing about 2,000,000 trees. The oldest trees are four years old, and are 15ft. high and 6in. in girth. Altogether, Mr Brown has planted in the State forests 6,500 acres, upon which there are about four million trees in various stages The natural forests are also effectualy conservedand the expenditure of the department is already equalled by the revenue, while the improvements are estimated to be worth £150,000. Mr. Brown's system of management, especially with regard to the raising of the young trees and the trasplanting of them, was greatly admired and his resul's give the strongest possible proof of the practicability and profitableness of forests in the colonies. The profitableness of wattle-bark culture has also been demonstrated. The wattle, planted between the rows of gums were stripped at five years old and yielded 75lbs of bark each, the return paying for the whole plan

tation of both wattle and gums. The experiment made with wattle on the Sandy Desert land between the Murray bridge and Bordertown have been highly successful, proving that much of the lands in South Australia and Victoria can be profitably utilised for producing bark. Mr. Brown who has had a large experience of foresty in Europe and America asserts that his experiments in South Australia convinced him that the whole of the hard and soft woods used in Australia can be produced within our shores, and as most of the exotic trees grow to maturity in half the time they take in Europe, making better timber, the products of our forest ought to become an important item in the list of exports. The results shewn to the commissioners certainly give force to Mr. Brown's opinions.—

AGRICULTURAL OPERATIONS IN THE N.-W. PROVINCES AND OUDH.

[*Continued from last week.*]

One of the most important functions of an Agricultural Department is to disseminate useful information among the cultivating classes, so that they may be able to grow their crops to the best advantage. For this purpose demonstration farms and experimental stations have been established. At Meerut there is a demonstration farm, which appears to have done some good work during the past year, notwithstanding an unfavourable season. The wheat grown here on land 'green-soiled' with *crotolaria juncea* won the first prize at the Nauchandi Fair. Ensilage operations were also attended with some success : out of 250 maunds of grass and *charri* silaged, about two-thirds was realized as good fodder. One good effect of this farm was the stirring up a spirit of emulation among the people ; for it is reported that a young *Mohajan* of Meerut has organized his *Sir* land into an experimental station on a basis similar to that of the farm at Cawnpore,to which he paid a visit,and has set about the work, says Mr. Smeaton,"with an earnestness and absence of all attempt to attract official notice,that gives hope of perseverance, the point in which such efforts mostly fail ;" and that, following his example, other native gentlemen have commenced similar operations, so that the time is not far distant when experimental agriculture will become popular with native landholders as an earnest pursuit rather than a mere pastime.

The Cawnpore experimental station was prolific in the field of its operations ; while some of the results cannot but be regarded as extremely satisfactory. This is notably so in the matter of ensilage. Owing to an unfavourable season the *Kharif* crops gave rather poor results, and a scarcity of winter fodder ensued, a circumstance which was of value in proving the utility of ensilage. "This has, "writes Mr. Smeaton," now become a factor in the economy of the station of considerable value. Cattle were fed upon it for weeks together,while cartmen travelling on the Grand Trunk Road accepted quantities," presumably, because other fodder was scarce, and they no doubt realized the value of fresh succulent food for their cattle.

It is worthy of note that among experiments, those with wollen refuse from the Cawnpore Mills, as manure, gave increasingly good results. This is important, and the fact ought to be made widely known among the native cultivators. The value of experimenting was evidenced from the fact that maize cultivated as in America, and sugarcane as in Mauritus, proved *failures in both instances.* This teaches us the unwisdom of introducing methods of cultivation adopted in other countries with success, right off, without first ascertaining by practical experience whether they are likely to suit Indian conditions. Wheat gave 33·6 bushels per acre, which is very good for India, considering that 30 bushels per acre are considered a good outturn in England. These results in the face of unfavourable conditions are eminently satisfactory. In the repetition of set classes of experiments, which are intended to form a series from which eventually accurate deductions may be drawn, the results have now been classified ; and the advantage of alternating wheat with other grains, instead of repeating wheat alone year by year, is already made apparent, and will serve as a basis to work upon in future, to demonstrate the value of a rotation of crops. Maize and wheat alternated were found to give constantly larger outturns than when grown separately from year to year. The value of oil cake applied direct to land, as compared to feeding cattle with it and applying the resultant to land, was tried and resulted in favour of using cattle as an intermediary. In green-soiling, the value of growing lucerne after barely as a preparation for wheat, gave satisfactory results ; while the Lois Weedon system also gave fair results. The pods of *Inga dulcis* were used for feeding cattle and sheep, with the result that the animals gained in weight after having been fed upon them exclusively for upwards of three weeks. This tree yields pods in large quantities, and being very hardy, its more extended plantation in waste places and in grazing grounds is very desirable. "Spider silk" received a large share of attention from the superintendent of the Saharanpore Botanical Gardens, and some of it was sent with other products to the Colonial and Indian Exhibition.

Some years ago large shipments of American apples used to be received in Calcutta, by ships bringing natural ice from the American lakes ; but when artificially manufactured ice ran the natural product out of the market, the supply of apples to this country was cut short. There is, however, ground for hoping that apples from the Government Montesur fruit orchards of Kumaon will supply the want. Upper India is now largely supplied with this fruit from these orchards, which appear to have done considerable business in the way of raising apple trees from seed, and by grafting. No less than 10,000 seedlings having been got ready for grafting during the past year. Over 5,500 apple and pear trees were grafted, and over 5.000 plants distributed during the year ; while the demand for them is increasing beyond the power of the gardens to meet. It is noticeable that the demand comes chiefly from natives of all classes and that for fruit is equally brisk. A special gardener has been appointed to teach the natives how to cultivate these trees properly. While congratulating the Government upon these satisfactory results, we cannot lose sight of the fact that such a lucrative concern must, sooner or latter, clash with private enterprise, and it therefore seems desirable to take some steps to guard against such a contingency.

The cultivation of the mulberry tree for fodder was attempted,and the Head Gardener of the Saharanpore botanical gardens was entrusted with the conduct of the experiment. He planted trees over a foot apart, pollarded at intervals. Cattle would not at first eat the cuttings, the leaf stocks of which were too coarse, but ate those cut with stems 9 to 18 inches long. Cuttings in July 1885 gave 257 and 196 maunds per acre respectively of the *Morus multicaulis*, and another species from Cashmere. The tree being extremely hardly, it ought to prove a useful addition to the list of Indian fodders in seasons of scarcity. Saharunpore would appear to be an excellent field for the cultivation of the silkworm (*Bombyx Mori*). The cultivation of the Arabian Date Palm was vigorously prosecuted. There are now 870 plants in the Lucknow Horticultural Gardens, and 500 off sets have been indented for from the Persian Gulf.

On the subject of special forecasts, Mr. Smeaton writes : "During the past year regular forecasts of the condition and prospects of the three principal export crops, *viz.*, cotton, oilseeds, and wheat, have been received from selected zemindars all over the United Provinces. The number of reporting zemindars during the year has been 434. Their reports have been of the greatest value, and have furnished information which no system of official reports in the old fashion could satisfactorily supply. The gentlemen who have thus aided have now, I think, got entirely rid of the idea that the information which they give, can in any way be connected with the assessment of their estates, and consequently we get from them a perfectly free expression of opinion, and the results of the best enquiries which they can make." In the above we have in a few words the whole secret of the success which has attended the calling in the aid of private agency in the framing of these forecasts.

We have already on a previous occasion referred to the founding of an Agricultural Association in the N.-W. Provinces, From the report under notice we gather that it has proved a through success. It consists of 86 members, representing 31 districts, and met for the first time in April 1886, when the general lines of co-operation with the Agricultural Department were discussed and laid down. Good work has been done by

the members, and in every important matter concerning agriculture Mr. Smeaton consulted the members and received assistance and advice in a manner, and to an extent, which, sanguine as he was, he had not anticipated. To such an extent did they co-operate that, during the illness of the Assistant Director in charge of the Cawnpore Experimental Station, three of them came in rotation and took full charge of the station, conducting all the operations, and carying on all the correspondence in a way that left nothing to be desired. He goes on to say: "I have had a committee of them sitting on cases of application for patents for invention of agricultural implements; a committee of eight of them are assembling at the fourthcoming horse and cattle fair at Batesar to asist in the management and act as judges in the award of prizes. Two of them have established experimental and demonstration farms on their estates and are busy carrying out the agricultural improvements which have been proved to be successful and of utility at Cawnpore. Other zumindars, not members of the association, have, as has been described already, established similar farms. One member of the association has established a show-shed and mart for the sale of improved ploughs on one of his estates. These are all good signs, and I am hopeful that the field of usefulness will, year by year, be enlarged, and that the association will do credit to the name of its patron. I intend, if possible, during the coming season, to introduce the association to other spheres of useful work. The policy which I have in view is to make this association our agents for the prompt dissemination among the cultivating masses of all useful information on agricultural matters, and our *collaborateurs* in establishing improved methods of farming. The members have begun to appreciate the objects in view, and I believe they are really desirous of forwarding them. Once the members have succeeded in establishing a *cordon* of agricultural stations all over the provinces, the Cawnpore experimental station will have done its work and may be dispensed with." Much good work was also done in the way of agricultural shows. There were altogether eleven of them held during the year. In this connection Mr. Smeaton writes: "Along with the future of private experimental farms may be noted this year the initiation of private agricultural meetings,—that is to say, gatherings for the purpose of showing produce and implements, organized on two estates in Rai Bareili and Sultanpore, respectively, by landowners independent of either official aid or even official suggestions. We only know from requests to send a few implements that the gatherings took place, and doubtless they were extremely modest efforts: still as small beginnings of awakened interest in agricultural progress on the part of landowners, they are of interest."

A great deal of other useful work was also done in the distribution and sale of improved implements, improvements in Court of wards' estates, and a host of other matters. The record of the year's operations is a singularly varied and successful one, and this result is mainly due to the energetic and judicious administration of the Director personally.

SOME NITROGENOUS MANURES.

The value of a manure depends chiefly upon its possessing three of the most important elements of plant food, *viz*, nitric acid, in some form, lime, and phospates. Soda and potash are also valuable elements, and are usually found in some form. But it has been proved to demonstration that of all manures, those known as nitrogenous, *i. e.* those having a very large percentage of nitric acid, give the best results in the cultivation of our agricultural products. This point being settled, the question is, in what form does nitric acid yield the best out-turn? So far as our experience goes, nitrate of potash has been regarded as the most powerful of the nitrogenous manures. The value of farm-yard and stable manure is due to the presence in them of nitric acid and ammonia, but it has been superseded by most of our artificial manures because it is only as nitric acid that the nitrogen of the manure can be assimilated by plants, and this element is not set free in animal manures in such quantities and with as much facility, as in many of our known artificial manures, and hence the latter are more valuable for fertilizing lands upon which our nitrogenous crops are grown. It has, however, been found that nitric acid in combination with an alkaline base, is set free in larger quantities, and with more advantage to the structural development of plants, than in any other form; therefore nitrate of potash has always given the highest percentage of the nutritive elements in plants. Potash as an alkaline agent has its own value, but recent experiments have shown that the use of soda as an alkaline agent gives far superior results to potash; and therefore nitrate of soda is now justly regarded as one (if not *the* most valuable) of our most valuable manures, especially for what are known as nitrogenous crops—wheat in particular.

This point was very clearly brought out in a lecture recently delivered by Dr. A. B. Griffiths, F.R.S. (Ed.), F.C.S., to the agricultural class at the school of Science, Lincoln. The Doctor had carried out a series of experiments with the object of testing the value of various nitrogenous manures; five of them were tried (including farmyard manure) upon six equal plots of land, carrying three crops each, *viz.*, wheat, potatoes, and clover. The quantity of each manure applied was arranged so that each plot should have about the same amount of nitrogen. The following list shows the plots experimented upon, the manure used, and the time of application in the case of wheat. In the case of potatoes, and clover; the time of application of artificial manures was varied to suit the crop, the farm-yard manure being always applied in the winter:—

Plots 1—Received a top-dressing of 1½ cwt. of nitrate of soda per acre, in three instalments. The wheat plot received ½ cwt. in March, ½ cwt. in May, and ½ cwt. a short time before harvest.

Plots 2—Received a top dressing of 1½ cwt. of nitrate of soda per acre, all at one time. On the wheat plot it was applied in May.

Plots 3—Received top-dressing of 2 cwt. of nitrate of potash per acre, at the same time as plot 2 was dressed with nitrate of soda.

Plots 4—Received a top-dressing of 1 cwt. of sulphate of ammonia per acre, the same as plots 2, and 3 were dressed.

Plots 5—Received a top-dressing of 1 cwt. of ammonium chloride per acre, at same time as plots 2, 3, and 4 were dressed.

Plots 6—Received a dressing of 24 tons of farm-yard manure in the winter.

The first five sets of plots had a dressing of 12 tons of farm-yard manure per acre, applied in the winter. The last set of plots had a double quantity of farm-yard manure in the winter. The soil in the experiments with wheat was strong clay, and the yield of grain per acre on the plots was as follows:—

Plots	...	1	2	3	4	5	6
Bushels	...	50	42	21	34	20	18½

On analysis it was found that the grain and straw of plot No. 1, where the nitrate of soda had been applied in instalments, contained the largest percentage of meat-producing and flesh-forming constituents in their composition. The results of the same experiments carried out on the six plots of potatoes were an yield of tubers per acre, on each plot, as follows:—

Plots	...	1	2	3	4	5	6
Tons	...	20	17	14	15½	6	13½

The analysis of tubers from each plot gave the same result as in the case of wheat, viz., that there was the largest amount of nutritious matter in the plot that had received the nitrate of soda in instalments. The red clover plots gave the following yield of hay per acre:—

Plots	...	1	2	3	4	5	6
Tons	...	3½	3	2	2¾	1¾	2

The amount of chlorophyll, in equal areas of the leaves of wheat taken from each of the plots, was determined, and the largest amount was found in those grown on plot 1. By examination under the microscope of sections of the leaves of each crop, the number of starch granules present in equal areas were determined, and by far the largest number were found in leaves from plots that had received the nitrate of soda in instalments. The conclusions the Doctor drew from this work were as follows:—1.—Nitrate of soda is a good manure for cereals, legumes and roots, and before all other nitrogenous

manures. 2.—It is better to use it as a top-dressing, as the crops progress in growth, and not to apply all at once. 3.—Crops thus grown have increased an percentage of albuminoids and soluble carbohydrates, and are therefore more valuable. 4.—Nitrate of soda is a better manure for potatoes than nitrate of potash, although potash is highly recommended for this crop. 5.—Nitrate of potash in many instances yields no better results than farmyard manure, although it is a nitrogenous manure in a concentrated form. 6.—The chlorophyll in leaves is in greater quantity when grown with nitrate of soda than with any other nitrogenous manure. 7.—Those crops grown with nitrate of soda have a larger number of starch grains in chlorophyll granules than those grown with any other nitrogenous manure, and there is the greatest number when it is used in instalments. 8.—When nitrate of soda is used the harvest of all crops is earlier, especially root crops. 9—All crops grown with nitrate of soda resisted the attacks of parasite organisms, while those grown with potash manures more or less suffered from these attacks.

We do not remember to have heard of nitrate of soda being experimented with in this country at any of the Government experimental stations. It is doubtless a more expensive manure than nitrate of potash, but some trials might be made with it on a limited scale, just for the sake of comparison.

EUCALYPTUS TIMBER,

A few weeks back a correspondent asked us for some information regarding the relative value of Eucalyptus timber, when compared with Teak. Mr. J. S. Gamble very courteously sent us an interesting letter on the subject. A short time ago Mr. Allen Ransome delivered an address on "Some of our Colonian Woods," from which we make the following extracts relating to the timber yielded by various species of Eucalypti, which might prove of interest to some of our readers :

Blue Gum (*Eucalyptus globulus*).—This is a hard light-coloured timber of great strength, tenacity and durability. The tree, which is found in Tasmania, as well as Victoria, attains a colossal size. By way of testing the samples sent, a sleeper was adzed and bored, and a panel planned. Both experiments proved very satisfactory, the latter especially so, as the wood was found to plane as well against the grain as with it Being plentiful, it is largely used in the colony for beams and joists in buildings, and also for railway sleepers, piers, and bridges.

Red Gum (*Eucalyptus rostrata*).—This is a very hard, compact wood, of a reddish-brown colour, and is found throughout the colony along river flats and open valleys. It is largely used for fencing posts, and is well adopted for engineering works and buildings when required to withstand a vertical pressure, although on account of its short grain it is not considered trustworthy to support a heavy transverse strain. It has the reputation of being the best of all the gums for railway sleepers, being almost indestructible in damp soil

Blue Gum (*Eucalyptus leucoxylon*).—This wood, which is also found in the colony of Victoria, where it is known by the name of "iron bark," is considered one of the most valuable woods in the colony, the trees growing to a height of 100 ft., with an average diameter of 3½ ft. It possesses great strength and tenacity, and has a close and straight grain, on which account it is largely used by the coach-makers and wheel-wrights for shafts and spokes It is also extensively used for railway sleepers and piles. The experiments on this wood were in every case most satisfactory.

Jarrah (*Eucalyptus marginata*)—This timber abounds in the south-western portions of the colony, and the best grows on the iron-stone conglomerate hills, the finest quality being as a rule, found at the highest elevations. Stems have been found measuring as much as 80 ft. to the first branch, with a circumference of 32 ft., a height of 5 ft. from the ground. Visitors to the Colonial Exhibition cannot fail to have observed a fine log of this timber, 5 ft. in diameter, which, with its polished end, of a deep claret colour, was quite a centre of attraction in the Western Australian Court. The jarrah timber is hard, tough, and durable, and being proof against the ravages of the toredo, and white an, it is highly esteemed for piles, dock-work, and ship building purposes, as well as for railway sleepers and building constructions. To retain the valuable properties of the jarrah requires a somewhat special process of seasoning, and it is above all important that it should not be felled during the rainy season.

The system of seasoning jarrah, which is found to give good results, is as follows :—About four or five weeks before the tree is to be felled, it is girdled; thus effectually preventing any fresh sap from rising, and as the leaves continue to draw the sap out of the tree it becomes partially seasoned before it is cut down, as much as 8 lb of water per cubic foot, being extracted from the standing leg in this manner. When the leaves have withered the tree is felled, and at once removed to the saw mill, where it is converted into scantling or boards of the sizes required, which are then stacked and entirely covered with saw dust until properly seasoned. If not treated as above described, jarrah will remain imperfectly seasoned for many years, and if the heart is allowed to remain in the log, it cracks and splits to such an extent as to render it almost useless, while, on the other hand, if seasoned and converted in the above manner, yields very sound boards and scantlings. A portion of a jarrah pile which was taken out of Perth Bridge, over the river Swan, after having been for 35 years and 9 months between wind and water, was exhibitted, and shows no sign of decay, nor trace of the ravages of the toredo ; and a short piece of the same wood, also exhibited, which has served as a tram-rail on the jetty at Busselton for 42 years, shows how very little it has suffered from the constant wear of the wheels upon it during that period. Jarrah is frequently very handsomely figured, being shaded, or mottled, with dark waves and veins, and notwithstanding its density and hardness, it is easily worked by machinery. It takes a very fine polish, and might be used to advantage for shop front fittings, counter tops, and cabinet work. Its greatest uses, however, will undoubtedly be for sleepers and piles for harbour work, and as it can be imported and sold in this country for £6 per load of 50 cubic feet, it will probably, when better known, to a great extent supersede green heart for dock-gates and other work for which the latter is now generally employed.

Karri (*Eucalyptus diversicolor*).—This timber also grows in great abundance in the south-west portion of Western Australia and when sawn up and partially reasoned, so closely resembles jarrah in appearance, that anyone not conversant with both timbers, would find it difficult to tell them from one another, although in many points they differ materially. The karri grows to an enormous size, some trees being no less than 300ft. in height by 60ft in circumference.

Energetic steps are now being taken to introduce both karri and and jarrah largely into this country. and those interested in karri, claim for it all the attributes and advantages of jarrah, and it must be admitted that it stands a greater transverse strain than that wood : but while its suitability for internal work is well established, it is open to question whether it will last as long as jarrah in contact with the ground, or for marine structures. Karri timber in the shape of squared logs flitches, and planks of various sizes, can now be bought at the docks at from £7 to £8 per load of 50 cubic feet. Samples of both jarrah and karri timber, converted into straight and circular mouldings, match-boarding, spokes of wheels, and barrels are exhibited, and although both of these woods were readily worked by all the machines, the jarrah in every case left the cutters with a smoother surface than the karri. The treatment above described for seasoning jarrah, is found advantageous in the case of karri, and it may be taken to apply to most, if not all, varaities of the eucalypti, in which our Australian colonies abound.

Tuart (*Eucalyptus gomphocephala*)—This is another valuable timber tree, found principally between the Bunbury and Busselton districts. It is of straight growth, and yields logs up to 40 ft. in length by 24 in. to 30 in. square.

The wood is of a yellowish colour, hard, heavy, tough, strong, and of close texture, and for large scantlings it will be found a most valuable wood, especially where great strength is needed, The Tuart shrinks very little in seasoning and does not split while undergoing that process. It also stands exposure to all vicissitudes of weather for a long time without being affected by it. The experiments showed that this wood is well suited for wheel work, but its chief value would doubtless be for heavier purposes. such as the under framings for rolling-stock, ship-building timber piles for piers, and supports for bridges, and also as backing for armourplated ships, as no ordinary shock or rebound will cause it to split; and as it can be sold in this country at from £7 to £8 per load of 50 cubic feet. it is probable that it will frequently be used in place of teak

Miscellaneous Items.

We learn that [illegible] London [illegible]

[illegible]

The quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 29th March was 149,441,148lbs., as compared with 147,233,694lbs., exported in the corresponding period of last season. The exports to the United States and Canada were 89,233,839lbs., as against 81,292,923 lbs.

In Australia, we are told, eggs are preserved in glass jars with patent stoppers, which have vulcanised India-rubber joints. The jars are first stood in hot water until the air in them has become thoroughly warm and rarefied. The eggs are then wrapped up in paper to prevent their knocking together, and placed in the warm receptacles, their pointed ends being uppermost The jars are immediately closed up and then, and not till then, are removed from the hot water. It is said that if this process is skilfully carried out, the eggs will keep for many months.

The following notes regarding some of the industrial products of Japan may be of interest.—The exports of raw silk were in 1868 over 6 000,000, yen. and in 1885 over 13,000,000, reaching in 1882 and 1883 over 16,000,000 during each year, being in 1870 a little over 4,000,000 in value. The total exports of tea in 1868 amounted to over 3,000,000 yen, against nearly 7,000,000 in 1875. While the *quantity* has largely increased, the *value* has not increased in proportion; but the price of this commodity has fallen considerably. The exports to the United States in 1873 (the figures prior to that time not being given) amounted to less than 5,000,000, and reached the highest figures in 1885 when they went to over 15,000,000 in value.

Peat as a fibre for the manufacture of paper is attracting attention in America. A paper-maker who has been experimenting, informs the *Paper Trade Review* that "as a suitable material it may now be looked upon as an accomplished fact." The process of preparing the fibre is thus described: The turf, or top surface of the peat is removed, and is utilized for litter, and the fibrous peat is taken up with an ordinary peat spade, in strips or blocks, twelve inches by three, it is placed on trays, so formed that a current of air passes through, and placed in racks on the trays for partial drying. After being partially dried on the trays, the peat is put through a machine which thoroughly separates the fibre. The peat passes around a toothed drum, and at an incredible speed is separated exactly in the same way as a man would separate oakum. Great lumps of peat are shovelled in at the top of the machine, and are a moment later blown across the floor like so much wool at the rate of three tons an hour. The fibre is finally dried on the floors of the mill or manufactory, is put into sacks, and is ready for the market.

The *Queenslander* says:—One plant frequently met with on the sugar plantations in the North is the *Caladium esculentum*, an aquatic plant, which furnishes the large taro root so well known to the Sandwich Islanders and the natives of other groups of island in the Pacific. It is common on the Johnstone River and many places further north, and appears to be as thrifty as could be desired in those localities. Like rice, marshy ground suits it best, but like that cereal it can be grown on well cultivated land without much water. Caladiumlike, the large arrow-shaped leaves rise on high foot stalks immediately from the roots, but although the leaf and stalks are very agreeable to the taste, they are seldom eaten, as they are used for the purposes of propagation, these when severed from the root and inserted in thoroughly moist soil or mud, produce in six months a harvest of roots. It is estimated that 1,500 persons can be fed on the produce of a single square mile; but unless this estimate represents the entire food of that number of persons there does not appear to be much that is extraordinary in it. In those islands where it is common, the natives make thick paste out of the root; and this, under the name of *poe*, forms their staple article of diet. The south Sea Islanders are remarkably fond of making a patch of cultivation somewhere for themselves on the plantations in the North, and growing a few sweet potatoes and their old favourite the taro.

In reply to inquiries as to the use of sugar in chunam, (the marble-like coating of Indian rooms), and in ordinary mortar, a correspondent in the Ganjam district of the Madras Presidency, informs the *Produce Markets' Review* that the natives rarely use sugar in mortar for building purposes, but they use [illegible] prepared mortar for plastering walls, ceilings, and [illegible], which takes a high polish and makes a capital imitation of marble. It *will stand washing with soft-soap water*, and is composed of the following:—100 lbs. good slaked shell lime; 1½ lbs. country sugar (*cheeney*); the white and yolk of 19 eggs; 4 lbs. good butter-milk, 25 lbs. well sifted cleaned fine sand; 1lb. butter; 50 lbs. water. These articles must be well mixed and placed in a covered tub, and allowed to remain so for three days before using. If this marble mortar could be tinted, it might be very useful in the inner walls of English houses,—says the *Review*, and in its white state it would come in for ceilings. Washable walls and ceilings of a permanent character are a great desideratum in this country for sanitary purposes, and especially in our smoky towns. Our correspondent gives the following composition as having been used for ordinary building purposes, and found very serviceable: 120 lbs. lime; 240 lbs. sand; 2 lbs. jaggery sugar water in proportion.

The following excerpt from an exchange is interesting reading:—The medical journals for the past ten years have given accounts of wonderful discoveries in surgical science, and of their application in practice—the filling of large, deep wounds with sponge, and the organization and assimilation of the latter; skingrafting, bone-grafting, and the successful adjustment and re-growth of fingers. Recently two other wonderful discoveries have been reported. One is the organization of rubber within the animal tissues; the other, the organization of blood clots, their formation into new tissue, and the application of them to the surer and better healing of surgical wounds. As to the first, it appears that Professor Vanlar, of France, had in a certain case, inserted a drainage tube of ordinary gray vulcanized rubber, one and one fourth inches in length, and one-fifth inch in diameter and that this, at the end of seven months, seemed to have undergone partial absorption. But, on examining it with a microscope, it was found that the substance of the rubber had become truly organized; that the lower end of the tube had become fully assimilated to the surrounding tissue, and had wholly lost its original form; that the part of the tube next above this had lost its orginal shapeless appearance, and had acquired a complex structure showing fine connecting tissue fibres with cells of various forms beteween them, and very numerous capillary blood-vessels Says the *Medical Record*:—"That India-rubber can thus become organized is the more remarkable when we consider that it is a pure vegetable exudation, devoid of all structure, and seemingly more calculated to act as a foreign body and so prevent the union of the wounded surfaces, than to undergo organization and to become thus an integral part of the animal tissue."

Everything now is more or less adulterated: even pepper has not escaped. For the benefit of those who interest themselves in discovering the adulterants of pepper, we reproduce from the *American Grocer* the following simple rules for detecting the same:—"Poivrette, or pepperette, is extensively used as an adulterant of pepper in Europe. It is a hard tasteless woody substance, absolutely worthless, composed of ground olive stone, imported into England from Italy, and sold at two cents (1*d.*) per lb. for the express purpose of being used for fraudulently increasing the weight of pepper. Some effort has been made to introduce it here. For the benefit of analysts and others we give five rules for its detection by the microscope—(1) Make a microscopic examination with a 2 5 object glass in daylight, or good lamp light, using a polariser and analyser parallel, and a selenite or quartz plate. The ligneous cells are clearly brought out in this way and can be counted. (2) To distinguish the pepperette cells from the cortical cells of pepper examine further with an object glass from 2 5 to ¼, using the polarising and analysing prisms crossed, and no selenite or quartz plate; the pepperette cells glitter with a bright bluish-white light, while the cortical cells of pepper have a yellowish white glitter, the other cells do not glitter at all. (3) Examine, with a 1 6, or better, a Swift 1 8, or still better, a Zeiss apochromatic 3 millimetre object glass in good daylight; the pepperette cells are bright and colourless, and have a peculiar structure, while the cortical cells of pepper are coloured and have some of their contents dark even when bleached. (4) Boil a small quantity of the sample in water with a little caustic alkali; when the starch and albuminous matters have been dissolved, dilute with more water and allow to stand, decant the coloured liquid and wash with more water; if

the washed solid particles are poured on a white plate, dark and yellow particles will be seen. The dark particles are husk and the yellow particles are pepperette. If there is any doubt about them the teeth will readily distinguish pepperette, or it can be distinguished by the microscope. (5) It is sometimes useful to determine the amount of cellulose in the sample, and compare it with the amount of cellulose in pure pepper which has undergone a similar amount of decortication, if the extent of the decortication can be judged by the colour of the pepper."

Selections.

THE ARGUMENT FOR AND AGAINST DEHORNING.

"THE FARMERS' REVIEW :—We read in the Review the statements of several cattlemen in regard to dehorning, that immediately after sawing the horns off, the animal walks away as if the operation was painless, and eats as if nothing had happened. I wonder if those men each had their ears sawed off close to the head that it would be painless. (I think not). This is unreasonable bosh. Such men should be treated according to the statutes of the state in regard to cruelty to animals. If God made a mistake in creating the horn, it is a fine thing that some men were smart enough for the occasion and put him to shame.—N. L. H."

We think it folly to claim that the operation of dehorning cattle does not cause suffering. The real question to be considered is, "Are the advantages resulting from dehorning such as justify the infliction of whatever degree of suffering attends the operation?" There are other operations, the propriety of which no one questions, which also cause suffering to animals, such as castrating males, spaying females, branding, cutting off the tails of lambs, making ear marks, etc. These operations under most conditions are regarded as necessary and so justifiable. In case of dehorning, if properly performed, we are satisfied the suffering is not as great as is claimed by many. The argument against dehorning because the animals were created with horns, would, if carried to its legitimate conclusion, prevent the castration of all male animals as an interference with nature, and if adopted and put in practice would in about three years bring about a condition of things among our domestic live stock which "N. L. H." would not find it pleasant to contemplate. In this, as in many other things, prevention is better than cure, and it is better to operate on the four weeks old calf, so as to prevent the growth of horns, than to let it grow up and then have a serious tussle with it to take the horns off. The comparison instituted by our correspondent between the suffering caused by taking off the horns of an animal and cutting off the ears of a human being is not a fair one. The horn is not supplied with sensitive nerves as is the ear. The only sensitive part is the thin membrane enveloped by the inner bony core, not thicker than a sheet of paper. Neither the outside horn shell, nor inside bony structure are supplied with nerves, and besides the nervous system of the bovine is not as delicate and sensitive as that of the human family.

Since the foregoing was written the following from the *North British Agriculturist* has fallen under our notice. We add it as a very candid, and in no way exaggerated, statement of the reasons in favor of dehorning: "The practice of cutting off all the horns of cattle is one which is revolting to all the instincts of humanity, and the high authority of Prof. Walley who at the recent meeting of the Society for the Prevention of Cruelty to animals, affirmed that it was most needless and cruel, will appear to ordinary persons to be decisive. There are, however some practical considerations which I should like to put forward. I may say that no one is more hostile to cruelty than I am. During many years I was an active member of a society for its prevention, and I have journeyed many a mile and spent many a day in investigating cases which came to my ears. I was at one time entirely of Prof. Walley's opinion on the subject of dehorning cattle, but I have seen grounds for changing it, and am desirous to state what they are.

"Some cattle are malicious, but many, in fact nearly all are playful. In jest, as in earnest, their instinct is to use their horns, just as a dog in playing will pretend to bite. But horns are a serious weapon even in play. In their natural state, roaming over wide plains, the malicious can be avoided by their neighbours and the playful can chase each other without coming in dangerous contact. But in our enclosed fields, still more in our confined courts or boxes, there is no escape for the weaker or less agile. Thus injuries from the dig of a horn are frequent. Often the horns are broken off by the middle by getting entangled in an encounter, and in many more cases than the public is aware of, the outer horn has thus been entirely detached by the root from the skin, and from the inner core of bone. Even when cattle are tied up long horns will reach a neighbour, and they are further a source of danger to the attendants who feed them, and who, if they are not very careful, are liable to get a very nasty and even dangerous blow from a toss of the head. In courts there is generally one beast which is weaker than the rest, and which is kept in such terror that it fails to get its proper share of food. Mr. Scott Skirving,* who admits that ripping of the skin is frequent, says it could be prevented by affixing large wooden balls to the tip of the horns. But though this would prevent ripping, it would not prevent violent blows, dangerous bruises, or the breaking of the horns by fighting. That these dangers to man and beast are really very general and serious is shown by the simple fact that an ox which has been dehorned will always bring £1 or £2 more in a market than one which has not. This is the money estimate by practical men of the injury (and pain) which its horns on an average cause. If wooden balls, which would cost 6d, would suffice to avert it, the difference in price would not exist.

"Dehorning, whether by cutting the horns off, or by eradicating them with a pen-knife from the head when a calf, obviates these risks. The question in point of cruelty therefore is, whether the momentary operations is greater or less than the probable pain through accidents. Since I have kept cattle, now some 15 years, and lately to the number of from 100 to 200 head, I have come slowly but clearly to the opinion that dehorning is the more merciful system. The pain is not so severe as may be imagined. I have seen cows with a horn snapped right across in a fight, or with the outer shell wrenched from the bone, through getting locked in the horns of a neighbour, calmly re-commence grazing, with the blood running down their faces. The same thing happens when the operation is performed by man. If rightly done, not one case in 500 shows the slightest bad consequences, or causes the animal to stop feeding, far less to fall off in condition. As far as can be judged by the action of the animals, it causes no more pain than the cutting off of the lamb's tails, which is performed on every one that is born, and infinitely less than another operation which is performed on half the young animals of the horse, cattle, sheep and swine tribes. The conditions of domesticity compel us to inflict a little pain in order to obviate much more."—*Farmers Review*

COCONUT CULTIVATION AND IRRIGATION.

We have received through Mr. W. H. Wright some particulars of a very interesting experiment made by Mr. Akbar in irrigating coconut-palms on an extensive scale. Mr. Akbar is proprietor of the Sirangapata and Pulsava Estates, covering 614 acres, in the Katukenda division of the Negombo district, Alutkuru-korale. His average yearly crop has been from 900,000 to 1,000,000 nuts. On this property he has expended about £1,000 in machinery, chiefly powerful force pumps, with some 15,000 feet of cast-iron piping, 4 inches diameter, besides 12,000 feet of other spouting. The property being some 150 feet above the Maha-oya, which forms its boundary, the water of the river is pumped up and distributed in channels among the coconut palms, with a result which, after personal inspection, has astonished so old a cultivator and planter as Mr. Wright is himself. During the first day's work some 20 acres of very dry land were irrigated, and the effect on the drooping palm-trees was almost immediate and very striking. The coconut-palm is a very thirsty plant, and has the faculty of very quickly appropriating liquid brought within its reach, so that on this occasion it seemed to drink up the irrigating water at once. Mr. Wright has no doubt that the experiment will prove a thorough financial success in giving bigger crops of nuts steadily, season by season, and maintaining the trees in full vigour.

Mr. Akbar also shows an example of capacity and enterprise, we learn, by manufacturing his own oil and coir, while we suppose he is the first Ceylonese to lead the way with an experiment on an extensive scale, such as above described, in irrigating coconut land with river water drawn and distributed by force-pumps.

As regards coconut cultivation generally, Mr W. H. Wright is now experimenting on his own account in the Mirigama valley, and he is likely to show what can be done through manuring and high cultivation. Although a comparatively dry region, Mr Wright says the palms flourish in the good deep soil, sending their tap roots far down. By judicious clearing of his land, leaving the large trees for shade for a year or two, by making large holes and burning *debris* to ashes therein, he is also able to plant his coconuts at almost any time of the year with satisfactory results. As to what may be done by manuring, Mr Wright has already proved in his garden at Wilhelmsruhe," Turret Road, where by careful planting, good soil and manuring, he has succeeded *in bringing coconut palms into bearing in three years*. Six to eight years have been considered the minimum hitherto, under the most favourable circumstances, and of course an exceptional garden experiment cannot be taken to regulate a plantation. But it is evident that, granted good soil and careful planting, with the means and opportunity for manuring, there is no reason why coconuts should not begin to repay in crops after five and six years. This in fact is the term given by Mr. D. Morris for bringing coconut plantations into bearing on the littoral of the West Indian islands, where, Mr. Morris says, there is great scope for the extension of the cultivation with the prospect of a clear return of £5 or £6 per acre per annum. In the favorite Madampe district in Ceylon where coconuts are being widely planted, seven to eight years is the term allowed for trees to come into bearing, and, meantime, a European gentleman who has gone in for coconut cultivating there gets a fair return by cultivating plantains between his young coconuts.—*Tropical Agriculturist.*

THE EUROPEAN SUGAR BOUNTIES.

HERR W. HERBERTZ publishes a long and able article in his *Deutsche Zucker Industrie* of the 18th instant, on the necessity for a reform of the system of Sugar duties in Germany and in Europe generally. Herr Herbertz shows that, although the German duty was raised last June from 1 m, 60 pf. to 1 m. 70 pf. per centner of beet roots, the net yield to the Treasury will be only £1,440,000, or less than in any previous year, since 1869, excepting 1885-6. This is mainly due to the average saccharine yield of sugar having reached the surprising average of no less than 11 95 per cent of the weight of the roots in the last beet crop, and Herr Herbertz anticipates that this yield is likely to progress still further, while he does not expect a reduction in the quantity of land put under Beet in the coming season 1887-8 It appears from official statistics, that from 1882 3 to 1885-6, inclusive, the saccharine yield in Germany rose from 9·51 to 11 43 per cent. of the root; and Prof. Märcker has shown what possibilities lie in this direction, by obtaining a yield of from 15 6 to 16 28 per cent. from several beet plants specially cultivated by him. Herr Herbertz considers it impracticable to fix a saccharine yield which would be alike fair to the revenue, to the cultivator of poor soil and to the cultivator of rich soil. He, therefore, definitely declares himself in favour of a duty on manufacture or consumption *(Fabrikat order Verbrauchsteuer)*, with the reservation, however, that so long as other competing countries continue to give their present export bounties, the Germans cannot dispense with them. This leads Herr Herbert to the subject of an International convention for the suppression of import bounties on sugar; and having regard to Great Britain's interest in her sugar-growing colonies; to Holland's desire to afford relief to Java; to the complaints in the Belgian Parliament of the small revenue received from sugar; to the inability of Russia to export sugar without heavy sacrifice; to the desire in the United States to revive the Louisiana sugar Industry;—the unanimity of feeling that something should be done would probably be complete, but for France. France, however, cannot continue the enormous bounties which she is now giving, and her sugar industry is exposed to continual alterations of the law, while her competing power in the market of the world would not be lessened by a general reduction or abolition of bounties. Herr Herbertz calculates that the sugar bounties of the present season will cost France £3,280,000; Germany, £1,886.690*; Austria, £1,000,000; Belgium, £816 500; Holland, £265,800; thus, these five countries, each of which shows a deficit in its annual budget, together expend 7¼ millions sterling in promoting the artificial growth of their sugar Industries. If these sums remained in the respective countries, it might be argued that they are merely shifted from pocket to pocket, and that the country itself is no poorer. But apart from the economical law that every country which interferes with the course of trade is ultimately the poorer for doing so, a large portion of the bounties has to be given away in the competition to sell to the foreign consumer, and is thus entirely lost to the donors. Herr Herbertz's arguments in favour of a general reduction in European sugar duties, as the only means of increasing the home consumption and thus providing natural, instead of artificial, outlets for the huge production, are already familiar to the readers of the *Produce Markets' Review*. The objection that some countries might not carry out an International Convention so conscientiously as others, is met by the proposal that a fresh Congress might then be called, in order to release all parties from the agreement. The very serious step of abandoning the tax on the beet roots, to which Germany is indebted for her enormous progress in sugar production, has already been taken by Russia and Austria, who have found it necessary to revert, the former to a tax on the manufactured article, and the latter to a tax on consumption. Russia has found no difficulty in establishing the necessary control over her sugar factories, and the increase in the average saccharine strength of the Russian beet since 1881, when the Beet Tax was abandoned, gives ground for hoping that the fierce competition which characterises the sugar industry, will supply sufficient stimulus to the continued improvement of the beet when the raw roots are no longer taxed. Finally Herr Herbertz's proposals of reform are as follows:—To procure by International agreement the abolition, or utmost possible diminution of the present export bounties in sugar; and to tax on consumption every kind of sugar in Germany, 12 m. per centner (12s per cwt.)

It is interesting to compare the growth in the German production of sugar, and in the amount allowed as draw-back, in recent years, side by side with the dwindling net revenue of the German Treasury from the sugar duties, which have been rather raised than lessened during this period:—

	Production Tons.	Amount paid as drawback. £	Net Revenue £
1879-80	424,125	1,289,554	2 641,266
1880-1	594,223	2 793,368	2 345,673
1881-2	644 781	3,001 646	2.091,849
1882-3	848,124	4 502 044	2,582 209
1883-4	986 403	5 446 981	1,757 566
1884-5	1,154,818	6 159,515	2,231,431
1885 6	438,131	4,583,428	1.144 426
1886 7 (estimate)	1 000,000	——	(estimate) 1,440.000

Produce Markets Review.

* The *Prager Zuckermarkt* considers that this is much below the actual amount of the German bounties in 1886-7, which the *P Z.* estimates at £2,170,000.

"ROUGH ON RATS."

AGRICULTURAL SCHOLARSHIPS.

IT was during the administration of Sir Ashley Eden that the Government of India founded two scholarships to enable two qualified natives of Bengal to prosecute agricultural studies in England every year. A very high standard of education was required for the candidates who would compete for those scholarships, we believe they were required to Pass the B. A. Examination of the Calcutta University in the Science Course. No favoritism was allowed in the selection of candidates, and the result was that the Government obtained first-rate men for the purpose. Indeed, the uniform success for the Bengal agricultural scholars in their collegiate career at Cirencester ought to convince any one that the best way to secure an efficient body of men for public service is to select them by the test of University examination. But this subject is not to our purpose just now. The candidates selected were required to join the Agricultural College at Sirencester in England, and study there scientific and practical agriculture in all its branches, for a certain number of terms. High hopes were at first entertained as to the future career of these students in this country, and there was naturally some disappointment when, on their return they were incorporated with the Subordinate Executive Service. However, this step gave Government the advantage of counting among its officers men who had received a scientific training in agriculture, and who are available for employment in work connected with the agricultural improvement of the country. But it was obvious, at the same time, that the Government would not require, beyond a certain limit, officers having scientific attainments in agriculture; and the limit, it appears, has now been reached. It is proposed that the scholarships should be abolished, at least for the present. It would, indeed, be a pity to abolish the scholarships altogether. The gain from a financial point of view would be a mere trifle, while a useful career for our countrymen would be closed.

If, therefore the Government does not require any more agricultural students for the present, the scholarships might very well be usefully turned to teach some other industry. A countryman of ours, who had lately visited some of the English manufactories, says that there are many industries which are comparatively so simple that they might be easily learnt by the people of this country. Glass-blowing is still much left to manual labour, and the manufacture of such little things as candles, soap, steel-pens, pins, &c., is not so very elaborate or complicated, as cannot be easily learnt, and introduced into his country by our young men. There is, at present, a growing desire among our people to learn industrial arts, and it would, no doubt, be very graceful on the part of Government to come forward with scholarships to meet this very laudable ambition of the people. Indeed, it is one of the duties of Government to help people in this way. China, and Japan particularly, have been doing the same thing on a very extensive scale. Japanese students are sent out in numbers at Government cost to study in foreign countries the literature and the industries of the most civilized nations of the world. And should it be said of the British, far more enlightened than any Asiatic Government, that it does not appreciate the benefits likely to be done to the country by sending out students to learn European arts and manufactures? The Government need not promise any appointment whatever to those who return to India after acquiring a knowledge of the industrial arts; but in order that the scholarships may not be wasted by bestowing them on worthless men, Government should require a high standard of education, such as was required of the agricultural students. Moreover, the candidates ought to satisfy Government that they will, on their return, be able to open a manufactory, and that they would do it within a definite time.

We have here sketched out a plan how the agricultural scholarships may best be utilized, and we submit the plan for the serious consideration of the Government of India.—*Indian Mirror*.

THE INDIAN WHEAT TRADE.

TO THE EDITOR OF THE "PIONEER."

SIR,—Though somewhat loth to crave further space in your columns, lest a too controversial aspect should be given to a subject on which I have had the benefit of your criticisms of the 16th instant I trust you will allow me to explain certain points wherein I fear, I have been misunderstood, and to strengthen such of my previous statements as might appear to rest rather on assertion than proof. *First*, then, as to the "independent authority" to whom appeal may be made to settle questions of refraction between buyer and seller. As the Wheat and Seed Trade Association Committee is "a Committee of mercantile men," it would clearly, with the addition of a Government expert, meet in every way Mr Smeaton's view of the trade's requirements, and truly, such acquaintance as the Calcutta wheat trade has hitherto had with Government experts, tempts me to hazard the opinion that the presence of so harmless an individual would be readily tolerated by the members of our committee. Nay, we should deem it but a small price to pay for a restoration of that confidence, which we first learn from Mr. Smeaton, the up country dealer has ceased to have in us. From your remarks on the deterioration of Calcutta linseed, I fear, I was not sufficiently explicit as to its cause. It was not, as you say, the introduction of the refraction system, which had always existed, but the elimination from the London contract of the reciprocal analysis clause. To illustrate the operation of this clause, suppose a parcel of Calcutta linseed sold for shipment to London, gauranteed to contain 96 per cent pure linseed. If on arrival it were found to contain 98 per cent, the Calcutta shipper, until four years ago, increased his contract price by two per cent; and in the same way if it contained only 94 per cent, pure linseed, he decreased it in a like ration. Since the elimination of the above-mentioned clause, however, nothing can be added, although the parcel proved to be absolutely pure, but the deduction for any difficiency of linseed is still adhered to. So long then as it was manifestly to our interest to ship clean seed we did our best to procure it: to day it is a matter of very slight a consideration to us what percentage of admixture linseed contains.

I still hold that exporters would be wasting their time and money in busying themselves to raise the standard of Indian wheat unless first satisfied that its sale would thereby be extended; and when all the evidence before them of late years has gone to show that the home trade in nearly all its branches prefers a "sophisticated" to a pure article, where is the encouragement to advertise the latter? It is a fact not to be gain-said that while the demand for the best quality of Calcutta wheat, No 1 Club, has steadily decreased, there is growing demand for a third quality—soft red which is inferior to, and contains on an average 2½ per cent more admixture than the second or ordinary No 2 Club quality, with which Mr Smeaton's reports deals I beleive exclusively. But, putting aside such facts as these, which need no interpretation even to the uninitiated, and ignoring the greatly increased shipments in response to home demands of linseed containing as much as 10, 18 and even 30 per cent. of dirt and less objectionable substances, we need go no further than Mr. Smeaton's report to find a sufficiently valid reason for the tendency of the home trade to give the preference to admixture produce rather than to clean. "A Cawnpore trader," writes Mr. Smeaton, "sends down 500 maunds of wheat containing impurities to the extents of only 2 per cent (under a contract for 5 per cent admixtured wheat): The Calcutta merchant, therefore, gets 15 maunds of pure wheat for nothing and thereby makes what may be called an un-learned profit of over 3 per cent." Now, for "Cawnpore trader" read 'Calcutta exporter" and for Calcutta merchant" substitute "London importer," remembering that such clean parcels are constantly shipped home quite distinct and separate from dirtier parcels, and the tendency of the home trade becomes easy of explanation. The home buyer who purchases Calcutta wheat at a price proportionate to its customary admixture obtains an allowance in price on all inferior parcels delivered to him, and accepts superior parcels as an unintentional gratuity from the Indian merchant. Dr. Johnson is credited with having desired a person who was about to give his opinion to first consider what his opinion was worth. It is, then, with great diffidence that I venture to say that some years acquaintance with the home import trade had led me to the conclusion, supported by my later Indian experience, that there is a growing disposition amongst home buyers and consumers generally to prefer absolute to relative cheapness. It is this disposition reflected on the trading centres of the East, which is to so great an extent answerable for the sophistication of Indian produce. I admit that such a statement appproaches some what to the "marvellous" when satirsfid in your paraphrase that the success of Indian wheat is partially due to the fact that it is in part not wheat at all;" but the facts above cited will show" that I have more than trivial grounds on which to base it. That Europe should yearly demand dirtier wheat and seeds is certainly not due to the ignorance of her buyers, for, as Mr. Wishart truly informed Mr. Smeaton, clean wheat has been shipped time and again, and the experiment has always resulted in a loss" A word in conclusion as to my charging Mr. Smeaton with a "brave defiance of political economy, in definitely fixing the cost of production and margin of profit on American wheat," Mr. Smeaton's assertion is that American wheat costs '33s. 6d. per qr landed in London, but fetches 36s. to 37s. per qr.' If the 33s. 6d. include the profits of the American middlemen through whose hands it passes on its way to Europe, a margin of 2s. 6d. to 3s. 6d. per qr. rewards the enterprising Mark-ane corn-dealer; a necessary deduction of such absurdity that from mere courtesy I elected to acouse Mr. Smeaton of weak reasoning rather than of gross credulity. And if the 33s 6d do not include these profits of the American trader, is not Mr. Smeaton, as I have said, defying political economy which holds, that cost of production includes cost of conveyance to market?

A CALCUTTA EXPORTER.

INSECT POWDER.*

THE Dalmatian insect powder, Chrysanthemum cinerariæfolium B. *et* H., known also by its Dalmatian name *buhach*, has been cultivated for several years past on a large scale in certain portions of California, the cultivators being Dalmatians who have settled there.

The best soil for this plant is loam, with a large proportion of sand. This kind of soil is particularly suitable for sowing, but it should be well mixed with old dung. The seed itself is mixed with sand and distributed over the soil as uniformly as possible, after which the soil is raked to the depth of about half an inch, and then gently pressed by passing a roller over it. Until the plants spring up the beds must be irrigated every evening, unless it rains. But great care must be taken not to overdo it, as the plant is very sensitive, throughout its whole life, towards undue moisture of the soil. After the plants have sprung up, they need not be watered more than twice a week. Weeds must be kept away until transplantation takes place, which occurs when the plant is about 6 inches high. It is then set out precisely like cabbage, about 20 inches distant from every neighbour, and afterwards needs no further attendance.

Buhach is a biennial (?) plant, therefore it flowers in the year subsequent to that of sowing. The flowers must be cut off just when they are about to open, as they contain the largest amount of essential oil in this condition. The cut flowers must be carefully guarded against dampness, and must be dried in the shade, never by exposure to the sun or to artificial heat. After the period of flowering is over the plants are cut off 4 inches over the ground, reduced to powder, and this powder mixed with that of the flowers, in a proportion not exceeding one part of the former to two parts of the latter. [This is the statement made by the author of the work from which we quote. It is made in such a manner that it appears to be the regular process followed, there being no intention at all to utilise the flowers alone.] The finer the mixed powder of herb and flowers is, the more effective will it prove to be. If any one wishes to prepare the powder himself and does not possess a suitable mill, he may use a mortar covered with leather. The quantity thus worked in a mortar should, however, not excepted about 1lb, to avoid heating the powder. When the substance appears to be comminuted, it is transferred to a fine hair-sieve, and the refuse remaining on it put back in the mortar. It is very difficult to reduce the stems to powder in this manner, which—as the author naively but truly states—is not a serious disadvantage as the flowers are the most valuable portion of the plant. Insect powder should be preserved in glass or metallic vessels which should be closed air tight.

Insect powder may be used either in form of dry powder or by fumigation or in the form of alcoholic extract mixed with water or in the form of infusion.

The work from which we quote advices to make the first mentioned method using insect powder cheaper by mixing it with flour, saw dust or woodashes which do not interfere with the insecticidal powers. [Of course this may be done by the use of the powder, provided the dilution is not carried too far.] The mixture ought to be made at least twenty-four hours before it is to be used, and should meanwhile be kept in air-tight vessels. Experiments have been made which show that such mixtures acquire greater efficiency by keeping. It was found, for instance, that a mixture of one part of insect powder and eleven parts of flour, applied immediately after being mixed to certain caterpillars was just sufficiently strong to kill them. But the same effect was produced by applying to them a mixture of one part of insect powder and twenty-two parts of flour which had been mixed twenty hours before. [The explanation of this may be that the volatile oil of the flowers probably becomes more thoroughly diffused through the mixture in the course of time.—ED *Am. Dr.*]

The employment of insect powder by way of fumigation is exceedingly effective, particularly in closed rooms where the dense smoke produced by it which is not at all disagreeable to human being

* Abstract of a chapter on the subject *Die Tropische Agrikultur* Von Heinrich Semler, in San Francisco. 8vo. 1886, vol i., p. 207. Reprinted in the *Journal of the Pharmaceutical Society* from the *American Druggist* January.

soon kill all insects, particularly those having tender or soft bodies. This method is especially valuable for the purpose of killing mosquits in rooms. All that is necessary is to place a burning coal in a spoon or other receptacle, and to sprinkle insect powder upon it. In larger rooms, the spoon may be carried about, or several may be thus used in order to distribute the fumes properly. After a few minutes every mosquito will be found dead; and, if the fumigation be kept up for about half an hour, the same fate will have overtaken also—according to the author—any fleas that might have been present. (He says nothing of bed-bugs, but it is certainly worth while to try the above method for getting rid of this troublesome pest, which is spreading gradually into houses of opulence and comfort, where such disgusting visitors had been previously unheard of!—ED *Am. Dr.*)

The third method of employment, in form of alcoholic extract is the most advantageous for use in the fields and gardens.

The principal drawback connected with the use of insect-powder is this, that its effect, when applied in substance, is only certain when it comes in actual contact with soft-bodied insects. In the case of hard-bodied or haired insects it often produces only stupefaction for a time. This drawback is to a great extent removed by employing the alcoholic liquid extract which may be prepared by percolation or according to the author by macerating 1lb of insect-powder for four or five days with 2 pints of alcohol in a warm place then separating the alcohol and adding 1 pint of glycerine. This liquid extract is to be diluted with water before use. For hard-bodied insects it may be diluted with twenty parts, for more sensitive insects with thirty to forty parts of water. If it is to be used out-of-doors it is self-evident that it should not be applied while rain is threatening nor during the hot part of the day. The best time is early in the morning while the dew is on the ground or during cloudy days.

If a decoction of insect powder is desired this may be readily made by pouring boiling water upon it and macerating in a covered vessel until cold.

In many cases a simple mixture of insects powder and water will be found quite effective. A good proportion is according to the author. 1½ oz. to 2 gallons.—This seems to be altogether too weak.

The, decoction, however, is much more effective. It must be used as soon after preparation as possible, and at a time when its effects will not be interfered with by the condition of the atmosphere.

It should be stated that the majority of insects do not die immediately after having come in contact with insect-powder or one of its preparation. They are at first only stupefied, but death usually ensues after a few hours and in some cases not after several days.—*Gardeners' Chronicle.*

A COMMON AILMENT.

ONE of the most common of all ailments is constipation, and one which, perhaps, causes as much suffering as any of the milder ailments of life. Its causes are many, but we think it safe to say that generally, if not always, constipation is attended with local weakness or want of tone of the muscular coat of the bowel. Sometimes a diminished secretion may be most prominent. It is not our purpose to go in detail into this subject, but to endeavour to outline a few commonsense rules for the guidance of individuals. The majority of cases of chronic constipation cannot, we think, be relieved permanently without adjuncts in the form of medicine, and it is imperative that the laws of health be regarded carefully.

A common form of constipation is that found in young girls, who are pale, poorly fed, and often overworked. The apartments in which they live are unhealthy. All should know that healthier surroundings and conditions, with, perhaps, a little iron, would soon suffice to recall the blush of health to the poor girl's face. For cases of this kind we find that the Elixoid of Quinine, Iron, and Strychnine answers well, provided the bowels are helped for a time to move daily.

For ordinary purposes probably the most valuable of all the laxative medicines are, what are called, the Laxative Tablets. They do not gripe, and are far easier to take than pills.

There is a form of constipation frequently met with in young infants. It is the too common and most reprehensible custom to give the little ones so troubled *grey powder*, &c. It may be perfectly corrected with cod liver oil; but as the trouble is always associated with some trouble with digestion, we recommend the Solution of Cod Liver Oil in Malt Extract. The value of the plan of treatment for adults as well as infants is none too well known. A tea, dessert, or tablespoonful should be taken after each meal, according to age

...ar those who have tried rubbing the abdomen daily (massage), a ... of water before breakfast and at retiring, and the effects of ...s forms of diet, we advise the Valoid fluid extract of Cascara ...ada in thirty drop doses and upwards.

...thow recommends that a one tenth grain of aloin be taken ...ly, but the Laxative Tables recommended above will answer ...er. Anæmic girls are much benefited by a pill of aloes and iron ...ied attention to the natural requirements of nature, is most ...nt with many. No one can be permanently free from this ...ble without the exercise of a little common sense. As a ...ulcent, and invaluable aid to the restoration of the regular ...ion of the digestive system, very many physicians consider that ...t there is nothing to compare with the Kepler Malt Extract. ...certainly is effective in many cases, and should be taken in table...nful doses.—*The Doctor.*

WHY AM I SO MISERABLE?

So weak and languid? Why such heartburns and pains in the stomach, such acidity, and such an unpleasant taste in the mouth? Why at times such a gnawing appetite, and then again such distrelish for food? Why is the mind so frequently irritable, desponding, melancholy, and dejected? Why does one often feel under the apprehension of some imaginary danger, and start at any unexpected noise, becoming agitated as though some great calamity was impending? What is the meaning of these dull, sick headaches; these violent palpitations of the heart, this feverish restlessness, these night sweats; this disturbed and dreamy sleep, which brings no refreshing rest, but only moanings and mutterings and the horrors of the nightmare?

The answer is: These are but the symptoms of Indigestion or Dyspepsia—the beginning and the forerunner of almost every other human disease. Indigestion is a weakness or want of power of the digestive fluids of the stomach to convert the food into healthy matter for the proper nourishment of the body. It is caused most frequently by the irregularity of diet, or improper food, want of healthy exercise and pure outdoor air. It may be induced by mental distress—the shock of some great calamity. It may be, and often is aggravated and intensified, if not originally brought on, by exhaustion from intense mental application, of physical overwork, domestic troubles, anxiety in business, or financial embarrassments. If the stomach could always be kept in order, death would no longer be a subject of fearful anxiety to the young and middle-aged, but what would be contemplated by all as the visit of an expected friend at the close of a peaceful and happy old age. However, the first hostile invader upon the domain of health and happiness is Indigestion.

Is there any relief, any remedy, any cure? That is the question of the suffering and unhappy dyspeptic. What is wanted is a medicine that will thoroughly, renovate the stomach, bowels, liver, and kidneys, and afford speedy and effectual assistance to the digestive organs, and restore to the nervous and muscular systems their original energy.

Such a medicine is happily at hand. Never in the history of medical discoveries, evidenced by a dozen years' thorough test, has there been found a remedy for Indigestion so speedy, so sure, and so surprising in its results as Seigel's Curative Syrup, but to-day it is a standard remedy for that almost universal affliction in every civilised country in Europe, Asia, Africa, and America. Public testimonials and private letters from military officers, bankers, merchants, ship captains, mechanics, farmers, and their wives and daughters, alike confirm its curative powers.

NEARLY RAISED HIM FROM THE GRAVE.

Swiss Cottage, Walton-on-the-Naze,
August 27, 1886.

A. J. White, Limited

Dear Sirs,—If a testimonial is of any use to you respecting the remarkable cure I have derived by taking your "Seigel's Syrup," you are at liberty to make any public use of this you may deem best. For upwards of twelve years I have suffered from extreme Nervous Debility and Gastric Catarrh which reduced me so that I was totally unable to do any business, and caused great prostration and weakness. About three years ago I had the advice of several members of the medical faculty, and under their treatment derived little or no good. Being in town some ten months ago, I was advised to try your Curative Syrup, and purchased a bottle I had not taken many doses before I began to feel a fresh man. I could walk with ease, while before I had hard work to carry one leg before the other. My strength gradually increased and my eyesight got better, which before I frequently lost, owing to the malady arising from a sluggish liver, often in bed for several days with piles, and could hardly move. I am thankful to you and to God for nearly raising me from the grave, for it was nothing but your Seigel's Syrup that has restored me to robust health.

Yours faithfully.
A. RICHOLD,

Revesby, near Boston.
December 31st, 1886.

A. J. White, Limited.

Dear Sir,—Your Seigel's Syrup I find has an increasing sale in this neighbourhood, and shall always do my best to further the sale of an article that every one that purchases speaks highly in its favour. I also have great satisfaction in saying that I quite believe my *wife was permanently* cured of Indigestion and Wind on the Stomach, from which she had suffered intensely some time previous to taking it.

Faithfully yours,
A. BURN.

Attanagh, Abbeyleix,
Queen's County, Ireland,
December 24th, 1886.

A. J. White, Limited.

Dear Sir,—I hope that your Seigel's Syrup and Pills may get the sale they so well deserve. I had a very delicate child, a boy now over nine years, but being averse to eating any kind of vegetable or food from his birth, I began giving him Mother Seigel's Curative Syrup, and after a few weeks he recovered so as to be able to consume as much food as other boys of his age, and to the great astonishment of the neighbours, he is lively, getting into flesh, and thriving as well as boys of his age do. We give all the credit of his recovery to Seigel's Syrup.

Yours faithfully
S. MAXWELL

[Registered No. 182.]

THE INDIAN AGRICULTURIST.

A WEEKLY

JOURNAL OF INDIAN AGRICULTURE, MINERALOGY, AND STATISTICS.

VOL. XII.] CALCUTTA :—SATURDAY, MAY 7, 1887. [No. 19.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 28TH APRIL, 1887.]

Madras.—General prospects fair.

Bombay.—Rain in eight districts. Reaping operations nearly completed everywhere. Lands being prepared for *kharif* sowings in five districts. Slight fever and small-pox in parts of ten, cattle-disease in parts of eleven, and cholera in parts of four districts.

Bengal.—Weather hot and generally dry. Slight rain reported in Midnapore, Rungpore, and Dinapore. Ploughing and sowing progressing well. Sugarcane and indigo coming on well. *Boro* rice promising and is being reaped. *Rabi* harvest over and threshing is going on. *Mahua* still being gathered. Cholera prevalent in Rungpore and Backergunge, elsewhere public health generally fair.

N.-W. Provinces and Oudh.—*Rabi* harvest nearly completed. Weather hot. No rain. Sugarcane and indigo being irrigated. Markets well supplied. Prices generally stationary. Small-pox, cholera and cattle disease in some places; otherwise public health good.

Punjab.—Slight rain has fallen in the Rawalpindi, Shahpore and Peshawar districts Fever still prevalent in the Hissar district; otherwise health generally good throughout the Province. Prices falling in the Ferozepore Amritsar, Sialkot and Peshawar districts; rising in the Rawalpindi and Dehra Ismail Khan districts; fluctuating in the Delhi district; elsewhere stationary. *Rabi* harvest operations in progress, expected outturn below average.

Central Provinces.—Weather clear and hot. *Rabi* harvest continues. *Kharif* ploughings commenced. Fever and small-pox in places. Prices steady.

Burmah.—Sporadic cholera in six districts; otherwise health of Lower Burmah good. Slight cattle-disease in one district. Reports received from eight Upper Burmah districts, Public health generally good,

Assam.—Weather seasonable. Rain general. *Ahu* crop doing well. Ploughing and sowing of *damai* and *murali* crops nearly finished. Deaths from cholera reported from Katigara: otherwise general health good. More rain wanted for tea in Cachar. Planting of sugarcane and ploughing for *sáil* commenced. Prospects of crops good. Prices steady.

Mysore and Coorg.—Slight rain reported in parts. Standing crops in good condition, except in parts of Tumkoor district. Prospects of season fair. Water-supply diminishing in parts of the Kadoor and Kolar districts. Public health good. Small-pox and cattle-disease prevalent in parts. Prices slightly fallen in Mysore, Tumkoor and Kadoor districts, and risen in Bangalore and Kolar districts.

Berar and Hyderabad.—Week rainless. Heat increasing. *Kharif* ploughings continue in Akola. *Rabi* harvest completed. Fever and small-pox prevalent in Akola, and Cholera still in Hyderabad Talukas. Cattle-disease in three taluks. Prices steady.

Central India States.—Week rainless. Weather hot. Nights cool. High winds. Scarcity of water in Neemuch. Few cases of small-pox in Goona city; otherwise health good. Cholera abating in Goona. Prospects fair. Prices steady.

Rajpootana.—Slight rain has fallen in a few districts. Tanks and wells are decreasing generally. *Rabi* being harvested with fair outturn. Cotton being sown. Fever and small-pox prevalent in Marwar, Jhallawar, and Bikanir; otherwise public health good. Cattle-disease prevalent in Todgarh and Kherwara. Prices fluctuating.

Népal.—Considerable increase of heat during the week. Prospects fair.

Letters to the Editor.

ROSES AND THEIR CULTURE.

I.

TO THE EDITOR.

SIR,—When it is remembered that the rose, the queen of flowers, is of Eastern origin, it will appear strange that no champion of the floral queen has risen before now to fight her cause and sing her praises in this country. In Europe, however it has been different, and many are the books written treating, of this beautiful flower. We have now, however, a work exclusively devoted to the subject in Mr. R. Barton West's *Roses: and how to grow them in India.* The author is himself a nurseryman, and has for some years devoted his attention to rose culture in Calcutta. His work is a very comprehensive one, so far as it relates to propagation, pruning, cultivation, soil, and the other operations necessary to successful growing; but it is wanting in one very important particular, *viz.*, that being designed to meet a want throughout India, as the title implies; it omits to deal with the various methods of treatment adopted in the Punjab, the N.-W. Provinces, the hill stations, Southern India, and so forth, in each of which the seasons and treatment vary considerably. To attempt to grow roses successfully in Simla, for instance, under the same treatment as that adopted in Calcutta, would be attended with fatal results. Nevertheless, Mr. West's book will be very welcome to the amateur rosarian, for the great amount of useful information it contains of a practical kind. There are some points, however, which I select *en passant*, upon which few rose-growers in India will agree with Mr. West: one is that plants raised by cuttings are "far stronger and better bloomers than worked ones." In practice, this method is not attended with success, no matter how carefully carried out; whereas by budding and in-arching much better results are obtained. Again, he says, with proper appliances "cuttings of most varieties may be struck nearly all the year round." This is quite possible in cold climates, but, I fear, that the amateur who attempted it in Calcutta, would meet with sore disappointment. The soil recommended for striking cuttings in is a "compost of one-third each of leaf mould, good rich loam, and silver sand." I need hardly say that no English gardener would ever attempt to strike cuttings in this compost: the soil generally used for this purpose is pure river sand. It is not my intention to criticise Mr. West's book too severely, because he deserves every encouragement for having given us a really handy book of reference; but inaccuracies such as those I have noted, detract from the value of an otherwise useful volume. As a general guide, I recommend Mr. West's little work to all amateur rose-growers in this country.

J. T.

II.

TO THE EDITOR.

As soon,
Seek roses in December, ice in June;
Hope constancy in wind, or corn in chaff:
Believe in woman, or an epitaph,
Or any other thing that's false, before
You trust in critics.

SIR,—Thus wrote one of England's greatest poets while smarting under the lash of his Scotch reviewers, and in this case the word *false* was no doubt employed in its fullest meaning, but in the case of your correspondent "J. T," in his criticisms on "*Roses, and how to grow them in India,*" I am convinced, that his errors arise from a want of knowledge of the subject,

Damn with faint praise, assent with civil leer,
And without sneering, teach the rest to sneer;
Willing to wound, and yet afraid to strike,
Just hint a fault, and hesitate dislike."

Your correspondent first complains that the book in question omits to deal with the various "methods of treatment adopted in the Punjab, North-West Provinces, the hill stations, Southern India, and so forth." Does he seriously think that it would be possible within the limits of a small volume, to describe the exact method of treatment required in every district in India? He however admits that "the work is a very comprehensive one *so far as it relates to propagation, pruning, cultivation, soil, and the other operations necessary to successful growing.* If this is the case, I should opine that it is all that is required by the average amateur gardener, who is generally an intelligent observer, and cannot fail to regulate the various operations so as to suit the exigencies of his own district. For no book ever written, or that ever can be written, will save a gardener, either amateur or professional, from the necessity of exercising his own judgment, so as to adapt his work in the garden, not only to the climate, but also to the weather and state of the soil.

Your correspondent next refers to the subject of raising plants from cuttings, and questions the statement as to plants on their own roots being "far stronger and better bloomers, than worked ones." Well, if the author errs on this point, he does so in good company, for such eminent rosarians as Reynolds, Hole, I. G. Baker, and many others, have given an unqualified verdict in favour of own-root roses, and the time will come when these facts will be generally recognised in this country. As to inducing cuttings to strike, my own experience has convinced me that when proper appliances are available, it is easier to do so in a warm climate than a cold one. I now come to his last criticism, and one which, considering the authoritative style he adopts, shows a greater want of knowledge of the subject than could be imagined. He says, "the soil recommended for striking cuttings in, is a compost of one-third each of leaf mould, good rich loam, and silver sand. *I need hardly state that no English gardener would ever attempt to strike cuttings in such composts, the soil generally used for this purpose is pure river sand.*" In confutation of this, I will quote what the leading English rosarians recommend:

W. Paul, in *The Rose Garden*, says: Cuttings should be inserted in a compost consisting of equal parts of leaf mould, turfy loam chopped fine, and silver sand.

F. W. Burbidge, in *Cultivated Plants*, recommends sandy peat or loam, enriched by leaf mould, or decayed manure.

Beeton's *Dictionary of Gardening* prescribes equal parts of turfy loam, leaf mould, and sand.

Beeton's *Book of Garden Management* recommends the same treatment.

Thomson, in the *Flower Garden*, advises equal portions of light loamy soil, leaf mould and silver sand, the sand perhaps more than in equal proportion to the other two.

The Rosarian's Year-Book, 1884, suggests one-half loam, and the other half in equal parts of leaf mould and sand. Wood in the *Plant Propagator*, says the soil should be maiden loam and decayed stable dung, quite old, of equal parts and well mixed.

River's *Rose Amateur's Guide* declares in favour of light mould or peat, and sand in equal quantities.

I trust this will be sufficient to convince your correspondent that there are English gardeners, and men worthy of the name too, that use precisely the same compost as recommended in the book in question; but I can trace no work on the subject that advises pure river sand for the purpose. Perhaps "J. T." will enlighten us on the point.

Your correspondent expressed his intention of not criticising too severely, and is certainly worthy of commendation, for we must remember that

Whoever thinks a faultless piece to see,
Thinks what ne'er was, nor is, nor ere shall be.

If however a generous public find no more glaring errors than those to which attention has been drawn, the author can safely abide by the result, for he will certainly have attained a greater degree of success than he could justly have anticipated.

HORTUS.

NOTE.—The two foregoing letters appeared in the *Statesman* recently. We publish both so that our readers might try the rival methods of raising cuttings.—ED., I. A.

Editorial Notes.

UP to April 4th, no less than 1,200,000 pearl oysters had been secured at the Ceylon pearl fisheries, and realised at auction from fifteen to twenty rupees per thousand. This means (taking the average to have been seventeen rupees per thousand) that a sum of twenty thousand and four hundred rupees were realized altogether by the sale of these pearl oysters.

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WE note that at the usual monthly meeting at the London Farmers' Club, a paper was read by Mr. Rix, of London, Colney, St. Albans, on "Harvesting;" the subject being dealt with in its mechanical aspect. In the course of his paper the lecturer gave an interesting account of the employment of electricity as a motive power on the Hatfield Estate belonging to the Marquis of Salisbury. It appears that the Premier, who takes much interest in electricity, and uses it at Hatfield for many purposes, avails himself of this convenient power to work the elevators for building the hay and corn stacks. Arrangements have also been made to thresh by electricity. The power is obtained from a water-wheel in a central position, and carried by the proper wires wherever it is required.

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THE *Pioneer* understands that the Indian Government have so far decided in favour of the fodder compressed by the process patented by Mr. Arthur Rogers, C.E., that they purpose giving it a practical trial. Colonel Jamieson has been instructed to proceed to Saharunpore and see a thousand bales of fodder pressed off by the Rogers method. These bales will then be put on the backs of 100 mules and 100 camels, which will march them about the country for six months, so as to test, we presume, whether the fodder will not deteriorate with long keeping, or under variations of season and climate. The bales will be unpacked in October, and if the fodder is then found to be sweet and good, Government may offer some terms to Mr. Rogers. There the matter at present stands.

***

OUR Lahore Contemporary says:—"An American newspaper recently announced a discovery in Kansas which was expected to 'revolutionise' the silk-industry of the New World. It had been found by experiment, we were told, that silkworms throve better and produced more silk of a superior quality, when fed upon the leaves of the Osage Orange than upon any other food. As the condition of the Indian silk-industry is one of the questions of the moment, the matter has been brought to the notice of the Revenue and Agricultural Department of the Government of India, who have applied to the Superintendent of the Government Botanical Gardens, Saharunpore, for his opinion as to whether the tree might be advantageously used in this country as food for silkworms; and if its cultivationn could be successfully established." We shall await with some interest the result of this reference.

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THE *Rural New Yorker* publishes an interesting report of a series of experiments carried out at Cornell University, the object in view being to determine the proper depth at which wheat should be sown. Eight contiguous rows of wheat were sown at the same time, but at different depths, beginning from half-an-inch to 6½ inchesa deep. No. 1, *i.e.*, at a depth of half to three-fourths of an inch, was found to be far the most vigorous plant in leaf and root, indicating that shallow planting is the proper method. This, however, would require proper preparation of the surface soil to receive the seed. The conclusions reached were, that taking into account the difference in soils, a depth of not less that ¾ inch, and not more than 1½ inches are the extremes for wheat, in order to secure the best results.

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WE have received the prospectus of an International Exhibition of dairy products and implements to be held next September at Parma, in the kingdom of Italy, on the occasion of the "regional agricultural competition in that city." A Royal decree has been issued by King Humbert, from which we gather that upon a proposal of the Italian Minister Secretary of State for Agriculture, Industry and Commerce, and considering the present condition of the dairy industry in that kingdom, as well as the opportunity now offered of giving this

industry a new impulse, and more especially of increasing the export of its products, it has been decided to hold this competition, to which an international character has been given. We are doubtful whether India can usefully compete in an exhibition of this kind, but for the information of our readers, we reproduce in another column the prospectus *in extenso.*

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WE learn that copies or extracts of reports of her Majesty's Diplomatic Agents at Paris, Vienna, and Berlin, on the subject of horse-breeding depôts have been issued. From these it appears that the total annual expenditure by the French Government on its horse-breeding establishment amounts to 269,720*l*. The number of depôts for stallions is twenty-one, the twenty-second establishment being the Ecole des Haras. The Government of Austria gives something over 80,000*l*., and that of Hungary 116,500*l*. a year towards the encouragement of horse-breeding, but a large amount (16,000*l*.) in Austria alone is spent on the purchase of promising looking young horses from private breeders for incorporation in the Government establishment. The total asked for the purpose of improving the breed of horses in Austria alone is little short of 140,000*l*. a year. In Prussia there are eighteen establishments, three of which consist of stallions and brood mares. The remaining fifteen are situated in the various provinces, and are depots for the stallions bred in the three studs referred to. The cost of the breeding establishments may be roughly estimated at 80,000*l*.

***

WE note that the Board of Inland Revenue has just issued revised regulations governing the permission given by the Lords of the Treasury in 1886 for the experimental cultivation of tobacco in the United Kingdom. Any occupiers of land intending to plant tobacco must, on or before April 5th, give notice to the Secretary of Inland Revenue, Somerset House, setting forth the extent of land planted, and the place, parish, and county where it is situated. After permission is granted, a declaration must be signed by the grower, to the effect that the revenue officers will, at all times, have access to the planted land and to the rooms where the tobacco will be dried. All tobacco grown and gathered must be removed to a drying-room kept there until properly cured, and then packed in bags, bales or casks of an approved size. After the packages are weighed by a revenue officer, the duty must be paid, or the tobacco deposited in a customs or excise warehouse. The penalty for growing tobacco without permisson, except in small quantities for scientific or ornamental purposes, still remains in force.

***

THE value of Basic cinder as a manure is becoming widely recognised ; for we learn that at a recent meeting of the members of the Agricultural Casino at Darmstadt, a paper by Professor Wagner upon 'The Importance of Basic Slag as a manure, was discussed. The first trials Professor Wagner instituted were in 1884, and some of the results were as follows.—Coarsely ground basic slag exerts a much smaller influence, whilst when ground fine it has an effect almost equal to superphosphates, double that of the phosphorus in Peruvian guano, and six times as much as the phosphate in bone dust. The customer should observe the following when purchasing the marketable basic slag :—First, the contents in phosphoric acid should be ascertained ; and, secondly, the fineness to which it is ground be examined. Four-fifths should be meal, and the one-fifth pass through a sieve with meshes I mm. square. The basic slag can be advantageously applied to moor land, meadows with a rich soil, and to wheat land ; and if so applied, the present prejudice of some farmers against it would soon cease to exist.

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A NEW method of making silage has been discovered at home. At a recent meeting of the Ensilage Society. Mr. Bateman, of Brightlingsea, Essex, well-known as one of the practical pioneers of the ensilage question, described a new system of converting grass and green crops to silage, which he had tried on a small scale himself, and found to answer perfectly last year. Pies were made of the green fodder, just as dung pies are formed, the horses pulling the laden carts over them for the loads to be shot out, and evenly distributed where wanted. Such pies would be of some length, the horses' pulling the laden carts up an incline at one end, and descending from the centre by a corresponding decline at the other. As the work progresses the green fodder is clamped up at the sides just as roots are clamped, and after sufficient green fodder has been deposited, a few cart-loads of earth are hauled up to be spread over the top, so that the entire silage pie may be clamped in to the exclusion of air. Mr. Bateman stated that one gentleman in the eastern counties had adopted the system on a large scale, and found it to answer perfectly.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 28th April, 1887 :—Rain was heaviest during the past week in Assam. In Madras, Mysore, Bombay, and Burmah there were showers in parts ; elsewhere the week has been practically rainless. The *rabi* harvest has been completed in all the provinces, with the exception of a few places in Bombay' the Central Provinces, and the Punjab, and threshing operations are now in general progress. Rain still holds off in the Punjab, here prospects show no improvement, and where the *rabi* harvest is yielding an outturn below the average in most districts. Ploughing for the *kharif* is in progress in Bombay, the Central Provinces, and Berar, and sowings have begun in Bombay. Agricultural prospects in Madras are fair, but rain is still wanted in one or two places. The outlook in Mysore and Coorg is satisfactory. The spring rice is promising and is being reaped in Bengal. The early rice sowings are in progress in Bengal and Assam. Sugarcane is doing well in Bengal, the North-Western Provinces and Oudh, and the Central Provinces and is being planted in Bombay and Assam. Indigo is being irrigated in the North-Western Povinces and Oudh, and the crop is coming up well in Bengal. Cotton is being planted in Rajpootana, and is being picked in Bombay and Madras. The public health is generally good in all provinces. Cattle-disease is chiefly prevalent in Madras, Bombay, and the Central Provinces. Prices are falling in four districts of the Punjab and in three districts of Mysore. Elsewhere they are generally steady.

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WHILE in the United Kingdom every thing is done to discourage the cultivation of tobacco, in Russia the reverse is the case. From a report recently issued on the trade of the ports on the Sea of Azoff, for the year 1886, we gather that the cultivation of the Tobacco plant is receiving yearly greater attention, and it is expected that it will soon become an article of export. "Last year the Imperial Government sent several persons to Turkey and Holland to study the culture and the different qualities of Tobacco, likewise the principal markets. They also visited the districts of Taganrog, and the data collected by them show that the climate and soil are admirably suited to the growth of certain Tobaccos which meet with ready sale abroad. Several kinds of seed have been brought to Russia. A manual for the culture of Tobacco is to be published, and encouragement given to extend the plantation. The average excise levied on this article for the past three years has been 17,522,014 roubles, and the sum paid yearly for Tobocco licences 1.767,180 roubles. At Rostoff Messrs. Asmoloff & Co's Tobacco manufactory turn out annually 6.000,000 roubles worth of Tobacco and cigarettes."

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THIS century will no doubt be named by generations to come the "artificial age." It was bad enough to have artificial butter in the shape of butterine and oleomargarine, in the manufacture of which lard formed the chief ingredient ; we but now have artificial lard. This article has recevied the name of "oleolard," and represents a new development of the resources of civilisation in relation to our food supply. Lard itself was largely used as an adulterant to butter, until oleomargarine took its place, and now cotton-seed oil is extensively incorporated with lard by American manufacturers, about 4,000,000 gallons being thus absorbed last year. The same oil is used in the manufacture of cheese, to take the place of cream extracted from the milk for butter. Oleolard has not yet been honoured by separate enumeration in the list of American exports, being allowed to swell the

total of so-called lard exports. The quantity of oleomargarine exported from the United States in 1886 was 35,250,000 lbs., as compared with a little under 20,000,000 lbs., in 1880; while that of butter was only 14,500,000 lbs., against 39,236,000 lb. in 1880. Thus the ground lost by the genuine commodity has been gained by the imitation. This gives some idea of the extent to which the production of one of the best of foods has been discouraged by the introduction of a greatly inferior article too long permitted to be sold for what it is not.

The Hessian fly scourge may be said to have been introduced into the United Kingdom, and to have found a home there. Miss Eleanor Ormerod, the well-known entomologist, offers useful suggestions for its destruction. Writing last month to an English contemporary, she says that the chrysalids, which resemble flax-seeds in appearance, have been found in large numbers on several farms in Hertfordshire, and near Errol, in Scotland. They have been observed in greatest numbers "among the light grain or shag which falls immediately behind the dressing fanners, or is delivered at the side by a shag or tail spout; also among the earth and small weed, seeds which fall through the sieve below the fanners." Further, that the "flax-seeds" have been found to the number of nearly forty in a handful of the light grain, and that in a four-gill measure of light grain (as it came from behind the dressing fanners) rather over ninety were found. This information as to where the "flax-seeds," are to be found is of the greatest importance. In about six weeks she says (very likely less, if the weather is favourable) the flies will come out of the chrysalis cases, lay their eggs on wheat, barley or rye, and start a new attack. It will be of no use asking what to do then to save the crop, for, according to the state of maggot attack (and good or bad state of the corn to resist it) so will be the damage. Everyone who will destroy the infected siftings and have shag or light grain carefully sieved clean of these pests, will save an enormous risk to himself and his neighbours. But all who let the subject slip through in careless neglect are fostering a lasting scourge which (if it settles in England as it has done in two-thirds of European Russia, in the course of the eight years which have passed since its very first observation in that country) will be worse than any other of the insect pests.

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The following is Messrs. Walker, Lambe & Co's monthly Indian and Ceylon tea report, dated London, April 5th, 1887:— The month opened with draggling sales and low prices for all except fine teas, but during the last two weeks there has been a general advance for all kinds, amounting in fine tippy teas to 2*d*. to 3*d*. per lb. above last month's rates. The extraordinary value offering at 7*d*. and under has been largely caused by the number of closing invoices sold, the bulk of which consist of low grades. While there seems every probability of a hardening market for these descriptions, the position of fine and finest appears to be doubly strong. The Calcutta advices give 75½ millions as the total of the crop, to which we may add another million from other ports, and of this 64½ millions have been sold, leaving a very moderate supply for our enlarged consumption. Seventy-six of the gardens have already sold their last invoices. Ceylons, in sympathy with Indians, were considerably depressed for all but finest growths at the beginning of the month, since when they have recovered somewhat in price. The quality is generally disappointing, and finest kinds are consequently much sought after. March public sales comprised—Indian 74,200 packages, Ceylon 12,200 packages; against 72,700 and 7,800 packages respectively in 1886. The averages realised during the month, ranged from 6*d*. to 1*s* 9½*d*. per lb; our list for March, 1886, ranged from 11*d*. to 1*s*. 7½*d*. per lb.

	1886		1887	
	Indian.	Ceylon.	Indian.	Ceylon.
Imports for March ...	6 493,600	399,400	5.489,500	746,300
Deliveries ...	5,807,900	316.700	7,151,400	616,200
Imports from commencement of season June 1	65,282,700	3,661.800	75,053,800	6,494,900
Deliveries do. do. ...	49,861,100	3,187,400	61,941,800	6 307,600
Stock on 31st March ...	29,672,000	1,212,800	33,844,600	2,054,300

We gather from the *British Medical Journal* that at a recent meeting of the South-east Hants Medical Society, the President (Dr. James Watson), in the course of some remarks on the opium question in China, said that the drug was brought with cotton from India in the thirteenth century, and ever since it had been cultivated more or less by the Chinese. The Chinese Government had always looked with suspicion on the cultivation of the poppy, and had earnesly tried to suppress it. The Chinese assert that opium-smoking was first had recourse to by sufferers from rheumatic, neuralgic, and other pains, and the depression of malaria and other ailments. It was now mainly used as a means of procuring a delightful species of intoxication. The effects of the habit were physical and moral. The opium-smoker was peculiarly liable to inflamed eyes; his appetite was irregular, and his digestion was impaired; he suffered from severe colic, and from constipation, followed by distressing diarrahœa; wasting of all the tissues took place; spermatorrhœa and loss of sexual power supervened. He neglected his family and his business, became dishonest and utterly degraded. Many in England believed that the majority of Chinese smoked opium, and that the habit was rapidly ruining the people, physically, mentally, and morally. This was now proved to be a great mistake. Sir Robert Hart, as head of the Chinese Imperial Maritime Customs, instructed the Commissioners of Customs at the various ports on the coast, and on the Yangtsze to report to him the amount of Indian opium that passed through the custom houses. This was found to be about 100,000 chests. Only one-third of 1 per cent. of the population smoked Indian opium. Probably not more than 100,000 chests of native opium were produced; but, supposing this amount was actually consumed, then opium enough was provided to supply another 1,000,000 smokers, which would raise the total number to 2,000,000, or, in other words, to two-thirds of 1 per cent. of the population. The total amount spent by China on Indian and Native opium was 25,000,000*l*.

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If statistics are to be relied upon, the wool production of the world contuines to expand. According to the *British Australasian*, the statistics exhibit an anomaly on the market of 1886. Whilst the drought has killed off many milions of Australian sheep in the past two years, and the quotations for wool have been exceptionally low, both Australasia and the Cape had forwarded more wool to England during 1886 than in any previous year. On the other hand, their rivals in the merino market—the River Plate—had shipped a smaller quantity than in the exceptional year 1885. A year ago it was said that it looked as though the South American trade was running that of Australasia hard; but now, if we look back over the 10 years, and contrast 1886 with 1876, there is shown an increase of 42 per cent in the quantity of Australasian wool exported, of 41 per cent in the Cape wool, and of 39 per cent in that of the River Plate. The table below is taken from the statistics supplied by Messrs. Helmuth, Schwartze and Co. Total imports for the season into Europe and North America:—

Year.	Australasian. Bales.	Cape. Bales.	Total Colonial. Bales.	River Plate Bales.
1876.........	769,000	167,000	996,000	274,000
1883.........	1,054.000	199,000	1,253,000	350,000
1884.........	1,112,000	191,000	1,303,000	365,000
1885.........	1,094 000	188,000	1,282,000	402,000
1886.........	1,196.000	236,000	1 432,000	382,000

It is remarkable how practically the whole of the Australasian wool goes to London as the international market, while the River Plate wools are shipped direct to the Continent. In 1885 there were 68,393 bales of Australian taken direct to the Continent, whereas, in 1886, the total fell to 50,524. There was, however, an increase in the direct shipments of the United States from 10,859 bales in 1885 to 26,477 bales in 1886 But these are really insignificant figures, and London may be said fully to hold its own. River Plate wools, on the other hand, even when brought in British ships, are taken direct to Antwerp and Hamburg; and as the channel is orginally made so the tide flows, and continues to flow after the original barriers are removed. Whether the new German line of steamers will be able to alter this any more than the Messageries Maritimes have done

remains to be seen But of the wool coming to London, the Continent buys more than half, the proportion taken in 1886, being 54 per cent.

A River plate bale is equal to about 1¾ bale Colonial

We have before us the Annual Report of the above Society for 1886. It is the first of its kind that has been sent to us, and is a record of much good work. The scope of the society's operations and enquiries are much the same as those of its congeners in this country. During the year under review, thousands of useful trees and shrubs were raised, while plants of economic value were distributed to applicants, but the demand for these was not as great as in the previous year. A good deal of attention was devoted to the cultivation of tobacco and fibre-yielding plants, many varieties of the latter having been introduced and experimented with.

It is noted that the climate of Burmah is as well adapted to the cultivation of jute as that of Bengal ; but it does not appear to be grown, for we are told that all the gunny-baggs used in connection with the enormous rice trade of the country are imported from Calcutta, Madras and elsewhere. The imports during 1877-78 amounted to over eight million bags, and this number increased to over 11¼ millions during 1885-86. In connection with this subject, the report says : "Burmah abounds in fibre-yielding plants growing wild everywhere, which might, under a regular system of cultivation, excel even jute in strength of fibre and in texture ; and could be adopted to the manufacture of much finer fabrics than gunny bags, but labour and capital are wanted to do this." We may state that we never held jute in very high estimation as regards its strength of fibre, but it would have been interesting if the report had named some of the fibre-yielding plants with which Burmah "abounds," and which grow "wild everywhere."

Tobacco growing appears to have made cons iderable strides under the energetic and able supervision of Mr. Cabaniss, the Assistant Director of Agriculture, Burmah, who ha s personally interested himself in the development of this important industry. But the imports from Calcutta and Madras are still very large, having exceeded 8,500 tons during 1885-86. It is, however, satisfactory to read that "although the Burmese are slow to adopt improved methods of agriculture, it is hoped that the trouble which has been taken to teach them has not been thrown away, so far as the tobacco industry is concerned." The great bar to the introduction of new industries into Burmah is the labour difficulty, combined with the reluctance of capitalists to venture upon them. It is, however, contended that so long as the one article of trade, *viz.*, the cultivation of paddy, continues to flourish and increase, as it has been doing year after year, Burmese cultivators in Lower Burmah will hardly be induced to take to anything else, no matter how promising the profits to be realized therefrom, and in however rose-coloured a hue it is represented to them. But we are told that in the newly-acquired province of Upper Burmah there are prospects of meeting with more success in the introduction of new and improved crops, such as wheat, coffee, cotton, tea, tobacco, gram, &c., which, in the lower province are grown with difficulty owing to the heavy rain-fall.

Large numbers of ornamental and other trees were raised from seed for sale and gratuitous distribution. No less than 5,033 of them were sold from the garden during the year, while the nurseries are well stocked with these and fruit bearing trees, such as the Dorian, Mangosteen, Rambutan, Orange, Guava, Sour-sop, &c. A large plant house has been built, and stocked with choice plants. The rose does not appear to thrive in Burmah ; not only is the climate said to be against it, but the fearful ravages of insects combine to make rose culture in and about Rangoon extremely difficult. This is a pity, as a garden without roses must be barren indeed.

There is incorporated with the report a "note on grafted mangoes" by J. B. Vinton. We have not heard of this gentleman's name in connection with mangoes, but he is evidently an enthusiast, and has been conducting experiments in grafting. His enquiries have led him to the conclusion that to successfully cultivate Indian mangoes of good quality in Burmah, they must be grafted on to the indigenous Burmah wild mango, and that the past failures hitherto attending the cultivation of superior exotic mangoes is to be ascribed to the neglect of this principle. Mr. Vinton also engaged upon experiments in grafting the custard apple, lichi,and mangosteen upon common indigenous stocks, and hopes to be able to distribute these fruits 'all over Burmah.' He has suggested to the society that it might co-operate with him in his experiments.

There is also a note on tomato cultivation in the Prome district, by Mr. J. F. Hodgson, of Shwedoung, from which we gather that this vegetable is indigenous there. No manure of any kind is used in its cultivation, the soil used being a sandy loam generally, and yet the fruit is described as averaging five inches more or less in diameter. This is an extraordinary size. But still more extraordinary is the fact that one thousand fruits can be purchased for from six to ten annas. It would, we think, pay Calcutta green-grocers to open a trade with Burmah in tomatoes. Mr. Hodgson says it is supposed by some that this vegetable was introduced into Burmah by the early Portuguese adventurers some two or three hundred years ago; others think the early missionaries brought it with them. But the writer adds that as they are more plentiful in Mandalay and other parts of Upper Burmah, they may be indigenous after all. The Chinese market gardeners keep the Rangoon markets pretty well supplied with English vegetables of all kinds, but cannot be induced to grow the tomato. This is regarded as something unusual.

The financial position of the society is in a very satisfactory state, having a closing balance at the end of the year of Rs. 4,797, and this after an unusual expenditure of Rs. 2,700 on account of roads and a plant house. It has been found impracticable to get either the natives of India or the Burmese (with few exceptions) to subscribe to the society, even with the advantages held out of getting English flower and vegetable seeds gratis, with plants at half-price. The annual subscription is only Rs. 20, which compares favourably with the Agri-Horticultural Society of India, the annual subscription to which is Rs. 32, with similar advantages. We hope to hear next year that this society has been more successful in getting members, and that the European residents have supported it more liberally.

We have received from the Government the following extract of a letter from Mr, Charles Maries, of Durbhunga, dated April 7, 1887,regarding trees suitable for soils impregnated with saline salts :—

In answer to your letter (demi-official) No. 99 of 30th March about trees for saline soils. When I came to Durbhunga six years ago, I was much troubled to know what to do with certain patches of saline soils of the worst description. One was the site of an old saltpetre factory, where even weeds would not grow. I had this soil dug deep (2 feet) and planted thick (3′ × 3′) with *Inga saman* (rain trees), *Albizzia procera*, *Albezia Lebbek*, *Cassia Florida*, *Millingtonia hortensis*, Sisso (*Dalbergia Sissoo*), Neem (*Melia Azadirachta*,) &c. The best were the two first named. They were sown in pans, transplanted when the second leaves developed, into single pots, and grown on till about 3 feet high in pots. The salt ground was prepared as above, and trees planted early in the rains. The ground in three years was completely filled with roots, and to all appearance the salt gone. The trees were thinned out last year only leaving the best, and the ground is very good now.

In another place near my house, where the ground was covered with white salts, quite one inch thick, and where nothing would grow, I had holes dug 4′ × 4′, and new earth filled in, and large trees 12 months old transplanted with good poles. I give the measurements of two on the worst ground to prove how they have grown—*Albizzia* 5 years old, height 40′, girth of trunk four feet from ground, 3′ 10″. A rain tree same age, girth 1′ 10″, height 20′, a spreading tree. The ground now is covered with *doob* grass, and I have some splendid plantains growing there. The trees, I think, should be thoroughly established in pots before planting, and this should be done in favorable weather just at the commencement of the rains. The *Inga saman* produces such an enormous quantity of surface feeding roots, and these yearly decay, leaving a rich deposit of vegetable matter in the ground, and making the soil open,

and I have no doubt the trees take up the salts too, that in a few years the nature of the soil is completely changed. The trees should be planted as thickly as possible. The timber is first-rate for firewood, and the trees bear lopping well. I should think it would be an excellent tree for swampy feverish places in Bengal, or elsewhere, being such an enormous water-absorber; it is as valuable as the willow, or *eucalyptus*; the willow being used by the Chinese as a preventative for fever, and always planted round villages in rice districts. *Albizzia* is said to be a valuable timber, it is certainly a very handsome tree. I can give you a supply of seeds if you care to have them for distribution and trial in other places. Rain tree seeds can be obtained from Dr. King, Seebpore Botanical Gardens.

We do not know to whom the letter is addressed, but probably our article on this subject in the issue of March 26th, attracted the attention of the Government, one of whose officials very likely made further enquiries of Mr. Maries. The following extract from a letter from Dr. G. King, of the Royal Botanical Gardens, Seebpore, dated April 13, 1887, on the subject, was received by us at the same time:—

The two trees referred to by Mr. Maries grow extremely well in Bengal. There was a great run on the rain tree some years ago, and many maunds of seed and thousands of seedlings were distributed from this garden. This is a South American tree which evidently affects swampy localities, and which finds itself quite at home in the Gangetic Delta. I did not know before Mr. Maries told me, that this tree will grow in saline soil, But as Mr. Maries is a shrewd observant man I have no reason to doubt his statement. *Albizzia procera* is a native of India. It also affects damp soil and grows well in the Delta. It is known to natives as the *safed Sirirs* I can supply seed and plants of both trees.

We are entirely of Dr. King's opinion so far as Mr. Maries' "shrewed observant" qualities are concerned, and he may be relied upon in this as in every other instance. We are very much pleased that the Government has taken this matter in hand; and as Dr. King is prepared to supply seeds and plants of both trees, we hope they will be widely distributed for trial on *usar* lands, and those with *reh* efflorescence, large tracts of which are to be found in nearly all parts of India, and which add such a desolate appearance to the landscape. These lands have been the despair of our officials, and no opportunity therefore will, we trust, be lost to reclaim them, by planting the Rain Tree and *Albizzia procera* thereon.

THE PHYLLOXERA PLAGUE.

Those who know what ravages this insignificant insect is capable of causing, can alone estimate at its true value the state of hopelessness in which the French vine-growers at present find themselves. We, in this country, are happily free from such scourges as the phylloxera and the Hessian fly; but there is no knowing at what period any one of these European and American insect plagues may be introduced into India, now that outlets for an export and import trade are being largely developed between India and those countries. We do not grow the vine to any considerable extent for the purpose of manufacturing fermented liquors, although there is no reason why we should not. At any rate, it may interest some of our readers to know something of the tremendous ravages of the phylloxera in France at the present time. The President of the Entomological Society, in his presidential address recently made the following remarks on this subject. He said:—

In July last I had opportunities for learning more about the ravages of the phylloxera in France, from personal observation and conversation, than I had ever before been able to do. A sojourn of some length in the Pyrenees Orientales brought the extent of the ravages vividly before me. I was in a district once covered with smiling vineyards, now there are only the dead stocks half concealed by weeds, left in the ground, ghastly reminders of the past. Or occasionally the dead stocks are piled in huge stacks for firewood and the vines have been replaced by maize—a poor substitute from a financial point of view. I met men once prosperous proprietors now impoverished peasants, still clinging to the scenes of former prosperity. The state of affairs there is repeated in very many other districts, and it was lamentably evident in that of Angouleme in passing through it by train. The famous Bordeaux district, however, seems largely to have recovered itself, and in passing through it one would not imagine that it also had recently gone through the same ordeal. In this district remedial measures and the introduction of new blood in the form of American stocks, said to be phylloxera-proof, have told successfully. And, speaking as an economic entomologist, I cannot resist the opinion (in holding which I think I am in a minority) that the want of introduction of new blood may have had a large share in rendering the vines, cultivated too much 'in and in,' ready victims to the pest when it first appeared. I am not armed with official statistics, but there appeared to be hopeful feeling to the effect that the phylloxera was exhausting itself (so far as France is concerned); let us hope such is the case. But I met and conversed with intelligent and far-seeing Frenchmen, who held that the future of their country depends more upon what turn the phylloxera may take, than upon political affairs. Never before has an insidious insect-pest caused such wide-spread and continued ruin.

The contest with this pest, however, would appear not to be as hopeless as the above implies, for we read in an English exchange that Mr. David Watney has written a highly interesting letter on this subject. Our contemporary says:—

Mr. Watney, who appears to take a very hopeless view of the future of French vineyards, adduces figures with which our readers are now familiar, to show what an enormous diminution has taken place in the last few years in the production of French wines, and at once states his opinion that this diminution is chiefly due, not, as many people think, to mildew and other causes, but to the phylloxera. He then describes the life and extraordinary fecundity of the phylloxera, and observes, we believe, quite correctly, that "there may be eight generations in one year; but if only five generations, the number produced at the same rate would be 25,000,000 insects from one ancestor." After a variety of researches, he says only one method has been found to effectually kill the insect, and that is by inundation, begun in November and continued for forty days, and he mentions very successful experiment made by M Faucon, at Mas-le-Fabre, near Avignon. There is no doubt, we believe, that inundation, or submersion, is considered the most effective plan for attacking the insect, but there is a good deal in what Mr. Watney says upon this subject—that "while it is important to do the utmost to exterminate the insect from the roots, for which purpose it is hoped that better means will be found, no effort should be neglected to kill the swarms before they take the wing, to kill them after alighting on their new vineyard, and to destroy the winter egg. Either of these three processes effectively performed for four successive years would probably rid France of her potent and deadly enemy." In his subsequent remarks we think Mr. Watney is somewhat harsh towards both the Government and the vine-growers of France. The latter he accuses of concealing as long as possible, from avaricious motives, the fact that their vines have become infected, and, with regard to the Commission appointed by the Government, he says that little practical benefit has attended its action, because it has principally studied methods of killing the insect underground, instead of directing its energies to a policy of extermination above ground. Of course, the phylloxera can never be exterminated unless prompt measures be taken against it when its presence is first detected; but, all this being admitted, it is impossible not to sympathise with vine growers who have hesitated to make an announcement which would be a practical condemnation of their entire crop. The French viniculturists have suffered almost unexampled reverses. Mr. Watney remarks that it is probable that the loss caused by the phylloxera already exceeds the cost of the Franco-German war, and M. Ph. Grandlien estimates it at £800,000,000, or four times as much as was paid to the Prussians. There is no reason for wonder then if the men who had to bear the brunt of such disasters should be tempted to think first of their own immediate interests. Eventually they might be benefited if they made the announcement at once; but they have to consider how they are to live in the near future and a promise that in four years they shall be relieved of the pest will satisfy neither themselves nor their creditors. With regard to the same mission appointed by the Government it comprises some of the chief authorities on viticulture, and it is safe to assume that the experts have not been going about for years, disregarding a remedy under their very eyes. Moreover, there is a prize of £12,000 lying ready for anybody who can prove that he has discovered an unfailing method of destroying the phylloxera, and it seems, to say the least, a little odd that neither continued inquiries of a strong Commission, not the powerful incentive of a sum of £12,000 should have brought to light the feasibility of the remedy which Mr. Watney regards as so easy and certain. Surely these

Frenchmen are strange people according to Mr. Watney's account. We think Mr. Watney is needlessly despondent in his view of the situation under existing circumstances. Something at all events has been done to stay the progress of the phylloxera. Bordeau correspondents have several times spoken hopefully with regard to the efforts made against it, and it is noticeable that in that department the production of wine last year was 666,000 gallons in excess of that of the previous year, although, in France, as a whole, there was a great reduction. Many other departments showed a more or less satisfactory increase, and we hope that in the coming year there will be a revival all along the line.

GARDENING IN CALCUTTA.—XII.

FERNS.

WITH some exceptions, ferns in their native habitats are found growing in shady situations revelling in a humid atmosphere. It may therefore be put down as a rule that the atmosphere of the houses in which they are grown, must be kept constantly moist if they are to thrive properly. This may be done by damping the walks and shading materials of the roof and sides with a syringe, not, however, wetting the foliage of the ferns more than can possibly be helped. I do not advocate syringing Ferns as some people do, and am sure that far more harm than good is done by this practice. In exceptional cases it may be beneficial, but it is only in such, and not as a rule; therefore it is advisable for all but the most experienced to avoid it altogether. If plenty of moisture is kept in the atmosphere by the means already suggested, it will answer the purpose quite as well as syringing the Ferns, and indeed better, as it will not be accompanied by the danger attending the latter course, especially with such delicate species as Gymnogrammas, for it is almost certain death to these to get their foliage wet, causing them to lose their fronds, become weak, and eventually die. An even temperature being kept up, with the necessary moisture, the next thing to be considered is the

WATERING OF THE PLANTS.

Those in pots should be examined every day, especially those in smaller ones, as they get dry much quicker and suffer sooner than those in larger pots. *Ferns and Selaginellas should never be allowed to become dry*, if they do so, it is sure to injure, and in some cases to kill them outright, but while care must be taken not to allow them to get dry, care must also be taken not to let them get too wet by watering *when they do not require it*, or the soil will become sour, and the plants sickly. In watering plants a great mistake is often made in giving them a little every day, thus keeping the soil near the surface damp, while that below becomes quite dry, and the roots being principally at the bottom, the fronds shrivel and die one after the other, causing much anxiety and disappointment. When a plant is getting dry a good supply of water should be given, filling the pot with sufficient to thoroughly wet the soil, and no more should be given till the plant really requires it. If a plant becomes very dry, as is sometimes the case, through being over-looked, the soil will be found to have contracted, leaving a crevice between it and the pot, so that when water is poured into the pot, it runs out again almost as quickly; in this case it does the plant very little good, as, instead of penetrating the ball, it goes between the pot and the soil, only wetting the soil next to the pot. To saturate the whole of the ball, it should be placed in a vessel containing water as deep as the pot, and allowed to remain for fifteen or twenty minutes until the water penetrates thoroughly. The water given to the Ferns should be as near as the same temperature as the atmosphere in which they are growing; in summer, of course, they will require watering oftener than in the cold season, but they must always have it when getting dry, at whatever time of the year it may be. In a few words, plants must be examined every day. They must be watered freely when they are getting dry, and not again until they require it.

POTTING AND SOILS.

Ferns require re-potting oftener when in small pots than in larger ones. The best time of the year to commence is about February, when they will be starting into growth, and the sooner they are done after that the better.

A compost consisting of good loam, leaf mould, and sharp coarse sand in about equal proportions, should be prepared, being well mixed together, broken and chopped small but not too fine, and never passed through a sieve or riddle.

The pots must be clean. If they have been used before, they must be washed and scrubbed inside and out, both being necessary for the health and appearance of the plant. The pot when used must also be dry, for if either dirty or wet pot are used, the evil of such neglect will be manifest when next the plant is to be re-potted for it will be impossible to remove it from the pot without leaving behind a quantity of the soil adhering to the sides, which will almost certainly break off, and also a number of the roots, and thus injure the plant. The soil and the pots being prepared, the latter should be cracked, that is, draining by putting one piece of a broken pot at the bottom, hollow side down, large enough to cover the hole, and a number of others over and around it, to the depth of an inch or so, according to the size of the pot, and on the top of the pot a layer of moss or leaves; the object of the former being to allow the surplus water given to the plant to drain away, and the moss to prevent the soil washing among the cracks and stopping up the drainage, which would soon cause the soil to go bad. The plant to be re-potted may be turned out of the pot in which it has been growing, in most cases, by placing the left hand over the ball of the plant and turning it upside down and giving the edge of the pot a sharp crack on the bench, when it may be taken off; then remove the loose drainage without injuring or breaking off the roots; put a little soil in the fresh pot on the top of the moss, and then place the plant in it; press down and then fill all round the ball with fresh soil making it firm but not hard, with the potting stick. The top of the ball when in the new pot, should be low enough to allow of a good supply of water being given when watering: say in a four-inch pot, leave half an inch, increasing it slightly according to the larger sizes of pots used. When the fern is firmly planted in the new pot, it should be gently watered with sufficient water to saturate the ball and new soil, and not again till it requires it, as previously mentioned. Large plants when re-potted will frequently require large quantities of the old soil removed, which must be done carefully. Care must also be taken not to put any plants into too large pots; it is better to pot them frequently, using a rather larger pot each time, than to put a small plant in a large pot, for, in many instances, such a course will cause death. Some will require re-potting several times during the year, but once a year, will be often enough for the larger ones. When a pot gets well filled with roots, the plant needs a larger one, and should be transferred, unless it is getting late in the year, and not likely that it will grow much more that season, when it may be safely left over until the beginning of the next year, seeing however that it is never allowed to run short of water. Healthy plants having filled their pots with roots may be moved generally thus:—from a 3-inch to a 4½-inch pot, a 4½ to a 6-inch, a 6-inch to an 8-inch, an 8 to 11 or 12 inch, a 10 to a 14-inch, and so on, the measurement being across the pot inside, at the top.

HANGING BASKETS.

These make beautiful ornaments, and many ferns to do well and show their beauty should be suspended, as their long, drooping, and graceful foliage is not otherwise seen to advantage. The baskets, whether of wire, cane or wood, must have a lining of moss inside in which the soil is put and the fern planted, being careful not to have the soil quite so high as the sides of the baskets, or the water will run off instead of through. These will require daily examination, and to be well watered as often as they want it, for they will be found to dry up rapidly. Some of the Adiantums, such as *assimile* and *venustum* send their creeping rhizomes down and through the crevices of the baskets, forming crowns and producing fronds in such abundance, as to hide the basket completely with a mass of beautiful green foliage, which shows well against the light, having a charming effect, not even approached when grown in pots.

FERNS IN ROCKWORK.

Ferns planted in rockwork want much less attention than when grown in pots. They have not to be watered so frequently, nor have they to be re-potted, but if planted in good soil to begin with they will grow rapidly and attain a size they rarely do when grown in pots; they must not be allowed to become too crowded, so as to interfere with the proper development of their fronds or shade too much the smaller-growing species planted underneath.

WARDIAN CASES.

There are many lovers of ferns who, living in towns, have no convenience for growing them on a rookery, and who yet desire to grow them. To such I would recommend a trial, on a small

scale, from a rustic stand 8 or 9 inches in diameter with a propagating glass to cover the plants, or the larger and more commodious fern or wardian case from two to three feet in length.

There are many varieties that can be grown in these cases, which, with a little proper care and attention, will yield great pleasure. Having procured a stand and glass, or case, soil properly prepared, as recommended previously, and ferns, place drainage at the bottom as in pot culture, cover with moss or leaves, put in the soil, plant the ferns, keeping the tallest for the , interspersing a little Selaginella, which will spread and the surface, then water gently until the soil is thoroughly damp, and put on your glass or close your case, which-ever you have; place them in a light situation but protect them from the sun if they stand at a window through which it shines. When closed up they will not require watering again for some time, but when the surface becomes dry they should be watered gently as before, and to the extent required. After a case has been planted for a year or so, it should have fresh soil put in, which will necessitate clearing it out and replanting the ferns at first, after which they will again grow with renewed vigour. Should the glass become damp through the condensation of moisture upon it a little ventilation may be given which will prevent it.

RUS IN URBE.

THE COLAR GOLD FIELDS.

The Mysore Gold Mines are about half-a-day's journey from Madras. They lie about 9 miles to the south-east from Colar-road station, on the branch line of the Madras Railway, between Jelapet-junction and Bangalore, and are distant from the latter cantonment about 50 miles. A very indifferent road leads from Colar Station to the gold mines, up-hill nearly all the way. The miners have some difficulty in getting up their supplies and machinery. On my way up I saw 68 pairs of bullocks struggling with a 7-ton boiler. There is talk of a railway, or tramway, from Colar Station to the mines, and no doubt, now that the prospects of the field are so promising, something will be done to improve communications.

The auriferous belt proper is found in a trough of metamorphic slate, in places much disturbed by intrusive trap rock. The breath of the belt has been ascertained to be nearly 5 miles, and the length, as far as is yet determined, 20. A longitudinal section gives nearly north and south, and a traverse nearly east and west. The strike of the lodes is, with slight variation, north and south, underly west. Configuration basalt in dykes running parallel to the lodes, decomposed slate, mica, schist feldspar, iron and quartz in lodes well defined and massive. Water is generally met with at about 80 ft. from the surface. The whole field shows traces of extensive old workings, and the surface is strewn with quartz, which by long exposure has become so weathered as almost to escape detection. There is gneiss to the east of the field, which has a dip of 8 or 9 degrees, and to the west, the strata contiguous to the gneiss are nearly perpendicular, so that I estimate the depth up to which productive lodes will be found, at from 3 to 4000 feet; but it has been variously estimated from 2000 feet to 1 mile. Any way, it is certain that there is sufficient depth to keep the present mines working for generations to come. The question as to whether this field owes its present appearance to *subsidence or diluvion*, is very interesting from a geologist's stand point, but as doctors disagree about it, I will not attempt to expound my own opinion, the more particularly as this question has but little practical bearing on the prospects of the gold field, from a commercial point of view, which is, I apprehend, the point you wished me to elucidate when you requested me to make the present report.

I will now mention the mines in order as they are met with on the road up from Colar, and I will then tell you what I have to say respecting each mine, or property, on the field:—The first mine is "Nine Reefs," about six miles from Colar Station, then follow "Balaghat," "Gold fields of Mysore, Nandydroog," "Ooregaum," Mysore West," (late "Kaiser-i-Hind") "Mysore," "Eastern Mysore," "Indian Consolidated"—Colar Section (late Colar Gold mine), "South-east Mysore," "Colar Central," and "Mysore Reefs," which is the southernmost of all. Of these nine reefs, Balaghat, Nandydroog, Ooregaum, Mysore West, Mysore, and the Indian Consolidated, are old mines, *i.e.*, they were started in the first "boom" of the Mysore gold fields, now about six years since; with the exception of the "Mysore," however, they were practically abandoned for a period.

The Mysore

Has worked continuously, and is the only mine on the field which has paid a dividend, so I shall speak of it first, as first entitled to public attention. This mine was started by Captain John M. Rodgers, one of the pioneers of the field, nearly six years since, and in the face of adverse reports he has always maintained his first conviction as to the value of the property. The consensus of opinion appears to be that this mine, judiciously developed, will ultimately make a very handsome return to the shareholders; but I am afraid that it is not being judiciously worked at present, and that the steady, onward movement which rejoices the hearts of shareholders, and attracts the public to an investment, will be found wanting for some little time to come. I do not for a moment mean to insinuate that anything is wrong with the mine, which, indeed, I consider an excellent property; but I wish to warn shareholders, that they may not be disappointed if they do not get all the good things they have been promised in the next few months, and not to lose heart even though there should be a falling off in the returns, as I foresee will be the case. My reasons for thinking thus, are as follows:—The quantity of ore extracted, and which gave such splendid results last year was out of proportion to the development of the mine; furthermore, the ore which was then surfaced was of a richer quality that is now being met with. The present state of development does not warrant the amount of ore recently raised. In fact the stopping out has been much too rapid for the drawages and sinkages, and it is evident that unless a much greater amount of energy is displayed, in working the rock drills, and driving the ends, a temporary falling off, such as is foreshadowed in my previous remarks, must be the result.

Nine Reefs

When work was abandoned in this mine, discoveries had been made of gold yielding quartz, and since work has been recommenced an improvement in the nature of the quartz has attended the further development of the mine, and the "Nine Reefs" is at present looking very promising. I am informed that a cablegram was sent to London by the superintendent a few weeks since, representing the discovery of quartz worth by assay 35 dwt. per ton. From enquiries I have made locally, it appears that with intelligent and economical working 10-12 dwts. per ton will pay all expenses, and leave a profit on any reasonable capital sunk in this field.

Balaghat.

Work in this mine was for a time practically stopped, but since new working capital has been found, the property is being admirably managed by Captain Prior, and a considerable amount of good ore ground is being opened out, so that when the actual stamping is commenced, there will be a sufficient reserve to keep up that progressive movement in returns, so much to be desired. The mania for premature stamping may suit the speculative shareholder, but it does not suit the *bonâ fide* investor. Ore has been struck on this property which has assayed 4 oz., to the ton. Taking into consideration the judicious way in which the mine is being developed, and the large reserve of working capital, I am of opinion that its shares offer a sound investment.

Nundydroog.

To the south of "Balaghat." The property of this mine was reported on by Captain John M. Rogers, when he was Superintendent of the "Mysore," and it was opened out to its present condition by Capt. B. D. Plummer, the present Superintendent of the "Mysore," who is reported to have always spoken highly of it. The deepest shaft is about 250 ft. There is every indication of this becoming a good mine,—truly, the returns have not been large, but the work is being done judiciously, and a steady improvement may be looked for as depth is attained, and reserves are increased.

Ooregaum.

This mine was closed for a time, but since the issue of preference shares, work has been recommenced. The mine when first worked did not produce rich quartz, and for some time past has been rather under a cloud, but I have confidence in the property. In looking over the field, I have come to the conclusion that a cross cut should be driven from Monday's shaft to the west, for the purpose of ascertaining if the "Champion" lode, which is the same that has proved so rich in the "Mysore," cannot be tapped. There are many on the field who believe that a cross-cut, driven in that direction, would be productive of good results. The shaft now being sunk on the northern boundary of Ooregaum to intercept lode which is giving good results in the adjoining mine, Nandydroog, will, I think, greatly improve the value of this property. This will be some consolation to existing shareholders, but I cannot recommend this mine as an investment, as I hear that the working capital is almost spent, and failing some extraordinary stroke of good luck, the shareholders will have to be

asked to put their hands in their pockets again to prevent a collapse; but when the time comes I most strongly recommend them to answer their director's appeal promptly, and keep the thing going, for as I have said before, I believe the property is good.

MYSORE WEST.

This mine was started principally by Bombay speculators in 1881, under the name of the "Kaiser-i-hind." During upwards of 2½ years many trial shafts were sunk in massive lodes assaying from 3-5 dwt. per ton; but the capital having been exhausted work was suspended. Within the last year an English company has acquired the property, work is being vigorously pushed on, and from the lodes now visible it my safely be inferred that with further exploration, some good paying stuff will be brought to surface. Gold bearing quartz in true fissure veins invariably improves in quality as depth is attained, and shareholders may have every confidence in their experienced Superintendent, Captain Tregay.

INDIAN CONSOLIDATED.

This Company owns and works properties both in the Wynaad and in this field. I think it regrettable that the two properties should be placed before the public as one concern, and that the good work and excellent results being achieved by its able management in the Mysore field, should be overshadowed by the meagre prospect of the Wynaad property. My remarks must be understood to apply exclusively to the "Colar section" formerly worked under the name of the "Colar Gold Mine," which is immediately contiguous to, and lies directly south of the "Mysore." "The Indian Consolidated" has a capital of £550,000, which is fully paid up, and I understand that the greater part was expended in the Wynaad, before the work on the Colar Section was commenced, which section, together with the Company's interest in the "Colar Central" is now expected to pay a dividend on the whole capital, and I am almost inclined to think it will, if the presence of unmistakeably valuable lodes, and the energies of its able Superintendent, Captain H Eddy, can make it do so. At any rate, the shareholders may feel confident that, with the present man at the wheel, there will be no extravagance and no mistakes made in working the mine. Up to February 1886 but little had been done, since that time the main shaft has been sunk about 130 ft, giving it in all about 240 feet depth, and the other shafts then in existence and which it has been decided not to abandon, have been proportionately developed. Seven new shafts have been sunk, the buildings have been completed, 344 tons of ore have been crushed by the elephant battery, giving a yield of 367 oz, or a little more than 7 oz, 1 dwt per ton, and there is a considerable reserve of ore in No 5 shaft, which will be brought to surface by the time the gravitation stamps which are now in course of erection, are ready to work. Drivage is going on for the "Champion" lode, which also runs through this property. The distance of this lode from the main shaft appears to be about 300 feet, and it will probably not be reached before the end of the year, but I confidently expect that when tapped it will add greatly to the value of the mine.

I shall conclude my remarks on what I call the old mines, by explaining that having mostly spent their working capital they came into disfavour, and were abandoned owing to adverse reports, which were made by so-called experts, who turned a deaf ear to the practical men who had started operations, and condemned the whole gold field of Mysore as worthless, when more capital only was required to develope it. These mines have, I consider, been badly treated by mining engineers and faint-hearted shareholders, but now that fresh capital has been subscribed, and able directors have taken them in hand, I prophesy that the prognostication of the men who started them will be verified, *if* they be worked judiciously, and the money be spent *underground*.

I now come to a series of mines which I shall call "new mines," which have been started since the old mines were abandoned, and I shall proceed to comment on them in order, as they are met with on the way from Colar station.

GOLD FIELDS OF MYSORE.

This company has undoubtedly a fine property, the area is the largest on the field, being twelve times that of the next largest, which is the "Mysore" gold mine. It is supposed that it is the intention of this Company to start working on some of its blocks, and dispose of the rest to other companies. Judging from the general lay, interspersed as it is among other properties which have been proved, I should say that if carefully handled, the shares would prove a good investment at fair prices, but it seems to me that the premium of £2 per share, at which they are quoted, is excessive, regard being had to the fact that very little actual mining has been done, and that the adjacent properties which were secured at an earlier date, seem to have the "cream" of the lodes.

EASTERN MYSORE.

This mine is contiguous to and lies east of the "Mysore," I have walked over the property, and judging from the configuration which generally coincides with the properties of other mines in this field, there seems no reason why this Company should not be successful. There are massive out-crops and traces of old workings, and the surface is strewn with good looking quartz. The ground has only very recently been broken, but two or three shafts are rapidly being sunk on the lodes, and I have no doubt that when depth is attained this Company will show up as well as it neighbours.

SOUTH EAST MYSORE.

Work was commenced in this mine on the first day of this year, when Captain John M. Rogers, the Superintendent, and his party, arrived on the field, and has progressed as if by magic. Ten shafts have been sunk, the blacksmith's and engineer's shops and pitman's house are completed, the store-house wants only doors, the assay house is just being roofed in; barracks, for the men and office are ready for roofing, and Superintendents quarters fairly on the way. The whole property of this mine is strewed with broken quartz, some samples of which I have ascertained to be very rich in gold, tons of it might be picked up which would yield gold in paying quantities, and which I understand it is contemplated to stack for crushing. At the southern boundary an extensive excavation is to be seen, and in one of the principal shafts they have sunk through 3 feet of old workings and continued the shaft vertically, leaving the old workings to the west, When at a depth of 100 feet from the surface, a cross-cut is to be driven to cut the lode, to ascertain if the old workers had gone below that depth. Judging from the experience related to me of other mines in this district, it is likely that evidence of old workings will be found even to a greater depth, and from the quantity of broken quartz lying about this excavation, I infer that the ancients must have found the lode to be exceeding rich, and concentrated all their energies at this point. In sinking through the old workings the dip of the gold is found to be to the north and underly west, and I have traced the lode in an unbroken line over 600 yards to the northwards. The shafts which have been sunk are located on three lodes well defined and massive and vary in depth from 60 to 90 feet. I have seen that quartz has already been met with in each shaft which yields gold in paying quantities and is being stacked for future crushing. Altogether the prospects of this mine are very cheering and the energy displayed in bringing it on so rapidy is most praiseworthy.

THE COLAR CENTRAL

Is bounded on the North by the "India Consolidated;" on the east by a block called the "Maharajah;" on the south by the "Mysore Reefs," and on the west by a block belonging to the "Gold fields of Mysore Company. The extent of the property is about 320 acres, and the principal lodes of the district run through it to a distance of nearly 4,000 feet. The nominal cappital of the company is £150,000 of which £70,000 is fully paid up shares, and £10,000 in cash was paid to the vendors, leaving £70,000 for working capital. The ground was only broken on the 1st January this year, 8 shafts have been sunk to a depth varying from 40 to 70 feet, and samples of the lodes have given gold up to 5 dwts per ton; but as few good results have been obtained on adjoining mines, before reaching a depth of 120 feet, there is every reason to suppose that as depth is attained the ore will increase in value. I consider this a particularly promising property, and if properly developed sure to pay. I have stated that the principal lodes of the district run through it; in addition to this there are most favourable indications in the property which bounds it to the east.

MYSORE REEFS.

This property is a part of the old Madras camp, and is the last mine to the south now working. It is bounded on the north by the "Colar Central." To the east, and close to the boundary of 'Maharajah' a block has been discovered, what I suppose must be called a new lode, which looks very promising. The work is being pushed on actively and intelligently. The ground has only been broken within the last two years, and fair progress appears to have been made; the quality of the quartz, it appears, from the report, is improving as depth is attained.

In the course of this report I have had occasion to mention the "Maharajah" block, casually. I understand that this property is shortly to be brought to the notice of the public. It lies S. E.

from the "Mysore" mine, and due south from the "South-East Mysore." I have seen evidence of extensive old workings and huge out crops throughout the property, which has an area of about 1½ square miles. Already three trial shafts have been sunk to a depth of 20 to 30 feet on three distinct lodes. I have taken numerous samples from each of the shafts which I have seen crushed and washed, which have shewn good heads of gold. But setting aside the pestle and mortar business, the appearance of the quartz from this property is the richest I have seen on the field; it is found in true fissure veins, and will unquestionably prove richer in depth. I say to investors: "Look alive, when the Maharajah is launched."—I believe it will turn out one of the best mines on the field.

I would now offer a few general remarks applicable to gold mining in this field. The reports from all the mines at present working show that as depth is attaind the quality of the ore improves. This is invariably the case in true fissure veins, but it is absurd nonsense to argue that because 20 *dwt* have been found at 50 feet, 100 dwt will be found at 250 feet, and as a matter of fact there is no arithmetical rule by which the improvement can be ganged. No shaft on this field has been sunk beyond 400 feet, whereas in Australia and California, it is not at all unusual to hear of shafts being sunk from 400 to 800 feet in depth, and in isolated cases to as much as 2,000 feet, before paying ore has even been struck, and yet many of these mines proved highly remunerative. From a correspondent working in one of the Australian mines, I have news only a few weeks old, and he says: "We are sinking a new shaft out of which we do not expect to get any paying stuff till we are down 1,000, feet, and this depth we confidently expect to attain before April next year." Let the shareholders in Indian gold mines lay this to heart, and not be despondent because they do not get immediate returns.

To those who are not shareholders, but who purpose investing, I would say: "The Mysore gold-field is more or less good, all over. Invest in concerns which pay the smallest sum in cash for their property, and which have the largest share of working capital in proportion to their share capital, and insist that a most competent man shall be placed at the head of affairs; that the working capital shall be spent as much as possible in the mine, and as little as possible on the surface. Having done this, sit fast and await results." Perfect harmony between the shareholders and the directors is most important, and would seldom be found wanting if only shareholders would take the trouble to elect the best men at the outset. I fully belive in the Mysore gold field as likely to prove a very remunerative investment. I have said my say, and I have reported faithfully what I have seen, but before signing my name I must acknowledge the valuable assistance I have received from Captain Stephen Rogers, who has patiently trudged over the whole field with me.

PARIS DRAKE BROCKMAN.

Miscellaneous Items.

At Poona, a few days back, a *gowali*, named Moonable, was fined Rs. 10 for selling adulterated milk. Monable artlessly pleaded that the milk was only intended for natives not for Europeans, but the judge did not recognise the difference.

We learn that, on the representation of several merchants interested in the tea industry, arrangements have been made by the Meteorological Department to include telegraphic Weather Reports of the Assam districts in the issue of the daily Bengal Reports.

The total amount of Indian sea and land customs revenue, exclusive of the salt revenue, for the official year 1886-87, was Rs. 1,20,50,000, as against Rs. 1,15,81,000 in the previous financial year. The import revenue amounted to Rs. 50,53,000, as against Rs. 42,82,000, and the export revenue to Rs. 69,90,000, as against Rs. 72,99,000.

Our go-ahead cousins are remarkable for turning out 'tall' things, the latest is a cabbage weighing over forty-two pounds. Our Chicago contemporary published a wood engraving of this wonderful cabbage, and in commenting upon it, says: "A 42-pound cabbage is something wonderful, and 50 dollars for a single cabbage is a little more surprising; yet this was the sum paid last year by Maule, the Philadelphia seedsman, for a head raised by Mr. Aug. Beyer, of South Bend, Indiana, tipping the scale at 42 pounds 4 ounces, after being dressed or deprived of stalk, root, and outside leaves. The cabbage was grown from Maule's celebrated "sure heads" seed. For the season of 1887 he offers $100·00 for the largest head also grown from his seed."

Selections.

INTERNATIONAL COMPETITION OF DAIRY PRODUCTS AND IMPLEMENTS.

HUMBERT I.

BY THE GRACE OF GOD AND WILL OF THE NATION,

King of Italy.

Considering the present condition of the Dairy Industry in the kingdom;

Considering the opportunity of giving to the said industry a new impulse, and more especially of increasing the export of its products.

On the proposal of Our Minister Secretary of State for Agriculture, Industry and Commerce;

We do Ordain and Decree:

Art. 1st. An international competition of dairy products and implements shall be held at Parma, in the month of September, in the present year, on the occasion of the regional agricultural competition in that city.

Art. 2nd. Prizes in gold, silver and bronze medals shall be awarded, and for the sum of 5,000 lire shall be purchased several of the best implements that have obtained the principal prizes.

Art. 3rd. The Executive Commission of the agricultural competition at Parma is charged with the execution of the dairy products competition.

Art. 4th. A ministerial decree shall determine and classify the prizes, and prescribe the rules by which the said international dairy products competition shall be conducted.

Our Minister Secretary of State for agriculture, Industry and Commerce is charged of the execution of this Our Decree, which shall be entered at the Court of account's office.

Given at Rome, January 23rd, 1887.

HUMBERT.
GRIMALDI.

In conformity with the royal Decree, January 23, by which it has been established that an International Competition of Dairy Products and Implements shall be held at Parma in the month of September 1887, during the regional agricultural competition in that city.

In accordance with the 4th article of the said Royal Decree by which it has been established that a ministerial decree shall determine the manner and conditions of the said competition; as well as the number and kind of prizes to be awarded;

On the proposal of the Director-General of agriculture:

DECREES:

Art. 1st. The International competition of Dairy Products and Implements shall be opened at Parma, on the first days of September, and precisely the same day in which shall be opened the regional agricultural competition.

Art. 3rd. The International competition shall consist of ten classes, with the following prizes:

1st Class.—*Milk preserves.*

Single section.—Preserved milk, condensed milk.
1st prize—1 gold medal;
2nd ,, —2 silver medals;
3rd ,, —2 bronze medals.

2nd Class.—*Butter.*

1st section.—Fresh butter.
1st prize—1 gold medal;
2nd ,, —4 silver medals;
3rd ,, —4 bronze medals.

2nd section.—Preserved butter, salt butter, melted butter.
1st prize—1 gold medal;
2nd ,, —2 silver medals;
3rd ,, —2 bronze medals.

3rd section.—Whey butter.
1st prize—2 bronze medals.

3rd Class.—*Cheese.*

1st section.—Cow-milk cheese, hard, rich, single, dry.
1st prize—2 gold medals;
2nd ,, —8 silver medals;
3rd ,, —10 bronze medals.

2nd section.—Centrifugated milk cheeses, dry as well as artificially enriched.
1st prize—1 silver medal;
2nd ,, 2 bronze medals.

3rd section.—Rich, soft and uncooked cheeses—Cream cheese of milk enriched with cream.
1st prize—1 gold medal;
2nd ,, —4 silver medals;
3rd ,, —4 bronze medals.

4th section (Totally reserved to Italian producers).—Imitation cheeses of the best foreign types: Emmenthal, Gruyre, Battlema Spalen (*Sbrins*), Chester, Edam (Dutch), Brie, Roquefort, etc.
1st prize—2 gold medals;
2nd ,, —2 silver medals;
3rd ,, —2 bronze medals.

5th section.—Ewe milk cheeses, goat milk cheeses, buffalo milk cheeses, mixed milk cheeses.
1st prize—2 silver medals;
2nd ,, —3 bronze medals.

4th Class.—*Inferior products of milk.*

Single section.—Clotted cream—Sugar of milk—Beverages of fermented whey—Utilisation of daily refuse.
1st prize—2 silver medals;
2nd ,, —2 bronze medals.

5th CLASS.—*Dairy machines and implements.*

1st section—Vessels and dray carts for the conveyance of milk.
1st prize—1 silver medal;
2nd ,, —2 bronze medals.

2nd section—Milk skimmers-Churns for butter-machines and implements for purifying, kneading, and salting the butter Butter-moulds-Milk, sieves.
1st prize—3 silver medals;
2nd ,, —4 bronze medals.

3rd section.—Mechanical cream collectors.
1st prize —1 gold medal;
2nd ,, —2 silver medals;
3rd ,, —2 bronze medals.

4th section.—Different systems of milk heating-Direct fire boilers and steam boilers-Apparatus for cooling and preserving milk.
1st prize—3 silver medals;
2nd ,, —3 bronze medals.

5th section.—Implements for breaking and for cutting the curd-Agitators, Presses, Cheese cloths or sacking Shapes—Curdbreakers-Implements for cleaning dairy material, cheese scrapers and cleaners.
1st prize—3 silver medals;
2nd ,, —4 bronze medals.

6th section.—Vessels and packing for the conveyance of cheese and butter.
1st prize—2 silver medals;
2nd ,, —2 bronze medals.

6th CLASS.—*Subsidiary dairy stuffs.*

Single section.—Rennet fluid and pulvirised—Prime stuffs for their preparation-Colouring stuffs for butter and for cheese; Innocuous reagents for perserving milk.
1st prize—2 silver medals;
2nd ,, —4 bronze medals.

7th CLASS.—*Instruments for assaying and for measuring milk*

1st. section—Instrument for assaying commercial milk and for chemical analysis—Milk density meters; Creammeters; Butter-milk-meters; Lactoscopes; Acid-meters, etc.-Thermometers for dairies; Instruments for recognising sofisticated milk.
1st prize—2 silver medals;
2nd ,, —3 bronze medals.

2nd section—Apparatus for weighing and measuring milk.
1st prize—2 silver medals;
2nd ,, — 3 bronze medals.

8th CLASS.—*Dairy buildings and premises.*

Single section.—Models, designs or plans of extant dairies. Methods of heating, ventilating and cleaning dairy rooms.
1st prize—1 gold medal.
2nd ,, — 2 silver medals;
3rd ,, —3 bronze medals.

9th CLASS.—*Dairy Administration.*

1st section—Papers on dairy subjects; Regulations for dairy Associations; Account books; administration books; books for technical annotations. Yield of milk worked with various systems, and respective economical results.
1st prize—3 silver medals:
2nd ,, —4 bronze medals.

2nd section.—Statistical informations about the production of milk, and about milk trade and milk food.
1st prize—1 silver medal;
2nd ,, —3 bronze medals

10th CLASS.—*Dairy teaching.*

Single section.—Models of dairy implements; Papers on milk industry; Practical handbooks for dairymen; Papers on cheese maladies, and on the means of improving cheese manufactory
1st prize—2 silver medals;
2nd ,, —4 bronze medals

Totals:
1st prizes—10 gold medals.
2nd ,, —55 silver medals.
3rd ,, —74 bronze medals.

The Ministry of Agriculture shall purchase, for the sum of 5,000 lire, several of the best implements that have obtained the first prize.

Art. 4th. All persons intending to take part in the competition are required to transmit the printed demand here annexed, with the informations therein requested, not later than the 30th of June 1887.

Art. 5th. With the exception of butter and cheeses made of double cream, or full cream, which must be delivered not later than one day before the opening of the Agricultural competition, every other product and implement must be transmitted from the 1st to the 15th of August to the Executive Commission of the competition in Parma.

All articles transmitted to the Executive Commission beyond the prescribed date, may be refused; in all cases they shall not be taken into consideration by the Jury.

Art. 6th. To every exhibit shall be annexed the following indications:

(a). Name and residence of the exhibitor or of his agent.
(b). Designation of the article, with a detailed account of its use and purpose.
(c). Manufactory price.
(d). If the exhibit is to be sold.
(e). Informations about the importance of its manufactory.
(f). Date of the preparation of the samples of butter, cheese and preserved milk exhibited.
(g). As to machines and implements, the exhibitor shall declare if he is the inventor, the manufacturer, or only an agent.

All agents for machines and implements, constructed in Italy or abroad, shall be considered only as representatives of the constructors, and in case of merit the prize shall be awarded to the latter.

The exhibitors unable to attend personally to the competition shall appoint their agent, and declare his name to the Commissioners.

Art. 7th. The acceptation at the competition shall be announced by the Executive Commission within the first two weeks of July.

Art. 8th. No exhibitor shall obtain two prizes of the same section.

Art. 9th. The expenses for carrying the products and the implements to Parma and back, as well as the expenses for placing and fitting them up in their respective departments, are at the charge of the exhibitors; they may however obtain all such reductions as are granted in similar cases by railway and navigation Societies, for the transfer of the products and of the implements, as well as for the respective fare of the competitors, agents, and workmen.

Art. 10th. No exhibitor shall be allowed to remove the articles exhibited before the closure of the Exhibition. Exception is made for butter and clotted cream, which having to be consigned the day before the opening of the competition, may be removed three days after.

Art. 11th. Soon after the closure of the Exhibition may take place the sale of the exhibits at the price marked on the ticket annexed to them.

Art. 12th. The Exhibits remaining unsold shall be taken back by the exhibitors within three days after the closure of the Exhibition.

Art. 13th. A Special Jury, appointed by the Ministry of Agriculture, chosen among producers and merchants, indigenous and foreign, but possibly in fair proportions to the articles exhibited, shall inspect the exhibits before the opening of the Exhibition, so that the visitors may recognize at once which are the most important, and it is established that in the same order of merit preference shall be given to those articles which offer the best and most encconomical advantages.

The Executive Commission shall have power to divide itself into sections of three members at least, in order to facilitate its own task.

The jurors shall have power to cut and try every milk food exhibitted, with the exception of those for which the exhibitors might have made a written declaration on the contarary, in which case these latter milk food shall not be taken into consideration. Cheeses known by external marks to be still green, shall neither be cut nor taken into consideration by the Jury.

Art. 14th. All exhibitions of machines and implements refusing to effect the experiments prescribed by the Jury shall not be entitled to any prize. Machines and implements that have obtained a prize in other competitons are admitted, but shall not obtain a new prize, unless they present some useful improvement, and provided the prize deserved by such improvement be higher than the prize obtained in the preceding competitions. In case they should be judged worthy of a prize equal to another already obtained, the jury is authorized to deliver to the exhibitor a confirmatory certificate. All expenses for the experiments of the machines, except for motive power and fuel, shall remain at the charge of the exhibitors.

Art. 15th. It is established that jurors being exhibitors are declared out of competition.

Art. 16th. The Jury shall determine the rules for tasting the products.

Art. 17th. The Jury, as above stated, have at their disposal, for the most distinguished exhibitors, 10 gold, 55 silver, and 74 bronze medals. To each medal shall be annexed the respective certificate, honorable mentions being excluded.

Art. 18th. The Jury, within a month of the closure of the competition, shall transmit to the Ministry of Agriculture a detailed report which may be accompanied, if deemed expedient, by the designs of the most remarkable implements awarded.

Art. 19th. The competition shall close with the ceremony of the distribution. The secretaey of the Jury shall proclaim the names of the exhibitors awarded, and read a short report pointing out the reasons for having allotted the prizes.

The president of the Executive Commission shall close the competition, pointing out the good qualities and the defects of the products exibited and the utility that may have derived from the competition itself.

Art. 20th. The Executive Commission of the Parma Regional Agricultural Competition shall have power to adopt all such further measures that may be deemed expedient, and which all competitors are bound to observe.

Given at Rome, January 23rd 1887.

THE MINISTER
B. GRIMALDI.

Request of admission to the International Competition of Dairy Products and Implements to be held at Parma in September, 1887.

(1). All persons intending to take part in the International Exhibition of dairy products and implements are requested to transmit the present form, post free, with all the information required, before the 30th of June 1887, to the *Executive Commission of the International Competition of Dairy Products and Implements at Parma.*

REQUEST OF ADMISSION

TO THE INTERNATIONAL COMPETITION OF DAIRY PRODUCTS AND IMPLEMENTS AT PARMA.

Mr. . . . .
residing at . . . . county of . . . .
begs to exhibit the following article requiring a space of . . .
square metres.

Class and section to which the article belongs.	Designation of the article.	Place where manuactured.	Annual product.	Price.	Remarks and possible information about the article to be exhibited.

Signature of the Exhibitor or of his agent.

THE COMMERCIAL PRODUCTS OF ASSAM.

The following items are taken from the paper read at the meeting of the East India Association on the 4th instant, (Colonel G. B. Malleson in the chair), by Mr. Oswin Weynton :—

SILK

There are no less than seventeen varieties of silkworms indigenous to the province of Assam. To go minutely into a detailed description of each would fill more pages mayhap than my readers would care to wade through, and result in leading to confusion, so allusion may be confined to the few that offer the most remunerative returns with the minimum of outlay. *Bombyx mori* is found in the jungles of south-west Sylhet, and at the other extremity of Assam, eastward of Siddyah. This is the real China worm, and feeds on the mulberry—which grows to perfection throughout the country—and yields the most valuable filature, though giving but one crop per annum. If any difficulty is experienced in collecting it, or doubts arise as to its genuineness when the cocoons are brought in, a card of eggs may be procured from Calcutta through your agents. Mulbery slips put in and well cultivated a year previous to the commencement of operations will have attained sufficient growth to feed the first stock by the time they arrive, and it is better to rear this particular species under cover, feeding them on trays with fresh leaves night and morning, paying particular attention to cleanliness. Every precaution must be, taken to keep this worm away from the next to be mentioned, as though an improvement may be looked for as to yield, from hybridization, there will be a great deterioration in quality. Free circulation of air is necessary in the sheds, which must be roomy and well lighted, the trays in which the worms are raised being placed on a bamboo framework in such a manner as to permit of easy and constant inspections, especially when the worm is about to spin, for in that condition they are great roamers; light slips of bamboo may be placed across the trays for the cocoons to attach themselves to. The subsequent reeling needs no notice except to mention that hanks should not exceed three feet in circumference.

Bombyx Sesna, the denomination being a corruption of the word China, is also indigenous both in Assam and Munneepore, but as hybridization has long been permitted, stock should be imported from down country. This variety is hardy and so thoroughly acclimatied that, with due precautions against birds and ants, it is best rearsed in the open. The worm, unlike the first mentioned, gives several crops per annum, though the quality of the silk is not so fine. It may be placed upon the trees from which the food of the former is gathered, care being taken when collecting the leaves that none of the worms are introduced among the more valuable species—the two being so similar in appearance that even the most experienced eye would fail to detect the intruder until almost irretrievable damage had been done not only in the admixture of inferior silk, but in impregnation as the moths emerge from the cocoons.

The Mooga, or *Antheræa Assama*, which feeds on the *sûm* tree, is classed among the *Attica Atlas*, and Eria group, and is of the same family known as the *tussa*, but the latter-named more nearly approaches the true *tussa*, and, though both produce good silk, it would be as well to keep them apart; no difficulty need the experienced in this from the difference of the plant affected by them as food. The *sûm* tree abounds throughout Assam, and if any doubt is experienced when the young worms are hatched, a leaf of the former tree and that of the common castor oil plant—which grows wild luxuriantly all over the province—should be placed in their way, the *mooga* will at once adhere to the former, the *Eria* to the latter, for the raising of which the spaces between the *dhal* plantation may be utilised; though, as both worms increase and multiply to an amazing extent, special planting of both *sûm* and castor will have to be made to keep up the needful supply of food. The *sûm* is a slow growing tree, and if the grant should not furnish it in sufficient quantities it will be as well to defer the domestication of the *mooga*, until *sûm* plantation has matured. But castor grows so quickly that a year will produce a mass of it on one acre capable of rearing many thousands of Eria, paths being merely necessary to facilitate inspection and collection, as the *Eria* is sufficiently robust to be reared in the open, as also the *mooga*, when the time comes.

Another worm that is allied to the *Eria* is domesticated in the Nowgong district of Assam; it yields a white silk, and is 50 per cent more valuable than either of those just noticed. The rearers, mostly Meekers, are chary of parting with the cocoons, but a little management, with the addition of a few rupees, will procure a nucleus, and a very cursory glance at the silk on the cocoon will prevent imposition; the men call it an *Eria*, but the name of *Mosenkunia Assama* is the correct term—*Missan* is known to the Meekers. It is said to be omnivorous, but a little observation will soon indicate its proper food. This worm is well worth the trouble and expence of procuring, for from its fecundity, the superiority both in yield and quality of its silk, bids fair to place it in the first rank of filatures in the European markets. The gigantic *Atticus Altas* which make it appearance about the end of September is also a member of the omnivorous *Eria* group, but though the silk yielded is copious, it is coarse in quality and of short staple. Experiments with various kinds of food might result in improvment in these respects, but sufficient has been shown to prove that silk raising in Assam from the known worms will pay, and pay well without seeking to domesticate fresh varieties.

Until one's silk factory is throughly organized it is not adviseable to prosecute spinning, but the cocoons—taking care to keep each sort separate—may be pierced longitudinally with a needle, to kill the chrysalis, and sent to the Calcutta market in that condition. Spinning is practised in all the villages under the hills, and women are adepts at it; but on no account should the cocoons be permitted to be taken to the villages for the purpose, not so much to prevent pilfering, but many natives resort to a method of freeing the silk from the mucilage that is most revolting and, though expeditious, tends to render the threads brittle when dried. If any difficulty is experienced in reeling off, the addition of some finely sifted bamboo ash to the luke-warm water in which the cocoons are soaked, will readily dissolve the the mucilage and cause the thread to run freely on to the winder; any particles of ash when the hank is dry, may easily be flicked off by lightly beating the silk with a thin cane. Taking the all-round average price of silk, from four to five shillings per pound, may reasonably be anticipated from the produce of the worms treated of in the foregoing remarks. Among the seventeen *varieties* there are doubtless a few that would be found suitable for acclimatization in the more humid semi-tropical tracts of the Australian Colonies, but the dampness of the Assam province sufficiently indicates that any attempt to introduce the worms into dry arid places, would not meet with success.

TOBACCO.

It will doubtless be a matter for surprise that when the nature, soil, and proximity of Assam to Burmah is considered, leaf tobacco for local consumption should form a large item among the province's imports from Lower Bengal, but yet it is so, the local cultivation of the *leaf* being almost exclusively in the hands of a few Bengalee time-expired coolies from the tea plantations in the Brahmapootra Valley, and Munneepore settlers, chiefly in South Cachar and Sylhet. From the latter an excellent leaf is obtainable, but should be procured fresh from the shrub, as in the process of curing, sweating is promoted by resort to the same objectionable method alluded to when hinting at the freeing of silk from mucilage—only in this case animal urine is used. The methods of curing need not be dwelt upon here, as my object is not the compilation of an epitome of manufactures, but merely the produce of raw material. Seed may be obtained, and in fact ought to be, from the best sources, for though there is no difficulty in getting your requirements in this line locally, no admixture of fresh stock has been introduced into Assam from time immemorial, hence a steady deterioration is proceeding year by year in all vegetable productions, and it may be remarked (parenthetically) in live stock also. This was well understood by the late Mr. Beecher of Gowhatty, who at considerable outlay, procured seed direct from Manilla as also importing cheroot manufacturers from the same place. The result was in every way most satisfactory, for though highly priced and not kept long enough to mellow, his cheroots, for the short time the manufacture was carried on, were highly esteemed. Unfortunatly he commenced his enterprise late in life, and at his death the manufacture was discontinued and a flourishing industry lost to the province. It is well worth reviving, and, if undertaken in a workmanlike manner, cannot fail to prove remunerative, as his success places failure beyond the pale of possibility. For the first season or two perhaps, it would be better to confine operations to simply curing leaf, and once a uniform quality has been attained, the produce should be shipped direct either to the London or Colonial markets, as though there would no doubt be a demand in Calcutta, the manufature of cheroots being entirely in native hands, and the general run of their customers not being connoisseurs, however superior your exotic leaf might be, it would hardly find a purchaser at a price its merits might fairly demand. At present the upper classes and Europeans prefer the imported article; there is however a large and growing demand for palatable cut tobacco.

COAL IN THE SALT RANGE.

Mr. H. Warth, in an article in the *Indian Forester*, writes:—

"The Salt Range extends from east to west, a distance of 125 miles, across the Sind-Sagar Doab, between the rivers Jhelum and Indus. It rises to 2,000, 3,000, and in one case to 5,000 feet above the sea. It derives its name from the extensive deposits of rock salt. In addition to the rock salt there is also coal, compared with the salt, the quantity of coal is very small, still a workable area has been found, and a colliery has been established (Dandot). The Salt Range is of great importance geologically, and highly instructive.

"Salt of an older palæozoic period forms the base, and above it follow palæozoic glacial beds, carboniferous limestone, mesozoic strata, then the coal, with a variety of tertiaries. The whole series of sedimentary strata is thus represented, and the number of fossils is very great.

"The coal of the Salt Range has nothing to do with the true Indian coal measures of the carboniferous period. The carboniferous rocks of the Salt Range are principally of marine origin. Only traces of coal occur in themand never any real seams. The coal of the Salt Range underlies the eocene,(nummulitic) limestone. About 500 square miles of the limestone form the plateau of the Range, and in several places good coal is found cropping out underneath. In some instances the excavations showed the coal unfit, or too thin, for profitable working, but the exploration in 1886, disclosed a sufficiently extensive portion of thicker seam under the small plateau of Dandot. On this the Dandot Colliery has been established.

"The field is an approximate square mile with sides of two miles length. Along the whole south side the coal has been proved continuous, 3 feet thick. On the west side it thinned out to 10 inches and towards the centre a bore hole proved 18 inches of coal at 340 feet depth. On the east 5 feet thickness of good coal were proved about a mile away from the Dandot plateau and lately one new drift disclosed the coal 3 feet thick on the eastern edge of the Dandot plateau itself. Some other drifts on the south scarp were continued in the coal, several hundred feet underneath the plateau and, apart from structural irregularities; the coal has kept on well, and improved in quality with the progress into the interior. A supply of one million tons has been estimated in the plateau, and what progress there has been in excavation corroborates this estimate as a safe one.

"A main low level entrance has now been started, and the mining is to begin in earnest after the colliery has been completely connected with the line of railway. A branch line on the broad gauge, about three miles long will be completed in a few months from Keorah (Mayo Mines) Station to the foot of the Dandot hills. From the foot of the hills to the colliery, a tramway is under construction with steep inclines on which the descending loaded trucks pull up the empty ones by means of wire ropes. Including this tramway the total length of the connection with the Keorah Station will be about 5 miles. The removal of the coal will thus become very easy.

"The excavation of the coal beneath about 400 feet of superincumbent limestone and alluvium will be a more difficult task. It is to be hoped that when the full working takes place the loss of life through the breaking down of the roof may be prevented. A liberal expenditure on supports and on filling material from the outside is advisable.

"At the time of my visit the actual outturn of coal was only 300 tons a month. It is of course expected to rise much higher after the opening of the whole Sind-Sagar Railway, and the completion of the bridge across the Jhelum River, at Chak Nizam. The Forest Department receives a royalty of 4 annas for every ton of coal raised. The Railway is at present the only consumer of coal, but a demand for coal may arise for other purposes.

"That the coal bearing strata extend over a very much larger area is known on geological grounds. The question is how far the seam continues thick enough for working. Chittidand, near Dandot colliery, was found to have a thick seam, but the area over which the full thickness kept on was not sufficient. Other places shewed the seam only 8 to 12 inches thick, but one (Tid) on the other hand has 5 feet. I have little doubt that places exist under the main plateau with areas of thick workable seam as extensive as the Dandot working area; but it would require careful and thorough exploration to find out such sites, and none could at present be more conveniently situated for railway communication than Dandot. A large salt mine (Mayo Salt Mines), and a colliery for the railway, being both situated on a branch of only 10 miles length, is very favourable.

"The rock salt is the lowest known rock of the Salt Range, and no strata underlying the rock salt have as yet been ascertained *in situ*, nor have any sinkings or borings been made to find out what is below the salt.

"The beds of gypsum overlying the salt form one continuous band nearly along the whole Salt Range, and the salt may also be nearly continuous. At the Mayo Salt Mines no less than 600 feet thickness of saline rock are known, and about half of the thickness is pure salt fit for human consumption. At other places the salt is thinner, sometimes only 10 or 20 feet of pure salt being visible. In the absence of excavations no general estimate can be made, but so much is certain that the supply of rock salt in the Salt Range is literally inexhaustible.

"A large amount of salt is actually exposed on the surface particularly inside of the deep gorges which cut through the high southern escarpment of the Salt Range. On the right bank of the Indus, near Kalabagh, there is enough good salt exposed for the supply, by mere surface quarrying, of 1,00,000 maunds a year to the Government Salt Depôt there (1 maund = 82½ lbs. English). The larger quantity about 12,00,000 maunds a year, which is issued at the Mayo Salt Mines, could not be conveniently obtained by quarrying, and seams from 50 to 150 feet thickness are worked underground. The seams are inclined and the excavation proceeds in regular parallel chambers 45 feet wide, 100 or 200 feet high, and limited by the width of the respective seams. Pillars, or walls of rock salt 25 feet thick intervene betwen the chambers, and bear the weight of the hill which is about 400 feet high. This system is in force since 1872, and a considerable underground space has resulted. There is one chamber 200 feet high, 200 feet long, and 45 feet wide, which just represents the whole output of one year, so much salt having been eaten by 15 million people in a year.

"The mine is provided with a tramway 2½ feet gauge which is working since 1878. The tramway leads from the interior of the mine to the Kheorah Station of the Sind-Sagar line, one mile from the mouth of the mine. The cost of production is less than one anna per maund, so that the imposed duty of Rs. 2 per maund, is almost entirely clear revenue to Government."

INDIGENOUS ARROWROOT.

TO THE EDITOR OF THE "TIMES OF INDIA."

SIR,—In your issue of the 6th inst, which I only read to day, I find an interesting paper in which Dr. *Lisboa* describes several Indian plants from the tubers of which arrowroot is prepared, and which are otherwise utilised as food in Bengal, Madras and America. Now that this subject has been brought before the public, I hope that some enterprising person will take it up and cultivate at least some of the plants which are stated by the doctor to grow spontaneously everywhere. The tubers of *Sad Kanda (Arisoma tartuosum)*, which are common on the Konkan hills, though unutilised as food by the Lepchas of Sikkhim, do not appear to be used as such on this side. This plant could be cultivated, and "the nutritious starch with which the tubers are filled" might, as Sir J. Hooker says, "be easily separated, and an aliment as good as Portland Island arrowroot be thus procured in quantities." The same might be said of the fecula of *Tacca pinnatifida*, *Curcuma angustifolia*, and *C, pseudomontana*, which are also common in Bombay, &c, and of the latter of which there are two specimens in the Victoria Museum: one made at Rattnagherry and the other in the N.-W. Provinces. Dr. Lisboa says: "Perhaps this plant (*C. pseudomontana*) yields a part of the East India arrowroot, for it is stated that in former times arrowroot was manufactured at Rutnagherry from its roots. These are prefectly white inside, and are boiled and eaten by the people during seasons of scarcity.

Mahableshwur arrowroot is still prepared from *Chowar (Curcuma Can ina)* on the hill, and sold in the bazaar there, but is not in much demand in the Bombay market for reasons which are not well ascertained. Dr. Kirtikar in his remarks on Dr. Lisboa's paper, says that he "had examined a specimen of the arrowroot grown at Dapoli (by Mr. Gupti) and had found it in no way inferior to the Bermuda arrowroot in its taste and microscopic appearance. He had made it into *congee* and found it palatable. He had no experience of the Mahableshwur variety. If that was found not quite palatable, the addition of sugar, port-wine and other adjuncts might improve its taste and render it wholesome to a sick stomach."

I am very glad that the two doctors agree, for Dr. Kirtikar endorses the opinion of Dr. Lisboa, that "this arrowroot (prepared by Gupti, at Dapoli) on examination, both microscopical and chemical, proved to be fully equal to the Bermuda arrowroot." But in regard to Mahableshwur arrowroot, Dr. Kirtikar does not appear to have understood the real question raised by Dr. Lisboa. The real point at issue is not whether the Mahableshwur fecula is palatable, for arrowroot derived from all sources are insipid, and can be made palatable by the addition of sugar, &c., but whether it is really deficient in nutritive principles, as is believed by some people. What are the reasons on which this belief rests, are not known, and, therefore a thorough analysis by a competent chemist is much needed.

The composition of all kinds of fecula is said to be almost the same, and if the article manfactured at Mahableshwur is not sold readily, it is probably because it is not presented to the public in beautiful tins or bottles, &c. I hope that the enegetic Director of Agriculture will cause analysis to be made by the Chemical Analyser, and other enquires to be instituted regarding the properties of this fecula.

Before I conclude I may make a passing remark about the opinion of Dr. Kirtikar, that "some acrid bulbs and roots are rendered palatable and wholesome by not only simply boiling them, but by adding a pinchful of common salt. The common *Soorun (Amorphophalus campanulatus)* was thus rendered a very useful table dainty." All Natives, and American and European writers, say that heat is absolutely necessary for the removal of acridity, and we know that many acrid vegetables to which salt is, as a matter of course, added, but which have been imperfectly boiled, retain their principle notwithstanding.

In conclusion, I would urge again on Mr. Gupti and others, to cultivate and prepare arrowroot from the tubers of *Tacca Curcumas* and *Arisoma*

April 11. INDIGENOUS INDUSTRY.

CONSUMPTION.

CONSUMPTION is a wasting, or a gradual consuming, due to general and local causes. The general causes are impaired nutrition, the local causes, disease of the lungs.

Impaired nutrition naturally includes much, as hereditary causes, febrile diseases, bad sanitation, &c. "If you want to know what you are going to be, judge by what you have been," contains much truth. If you would know what your family will be, see what it has been. Dr. Quain found that the statistics of the first Brompton Hospital report, and of others among the poor, revealed the fact that in one out of every four consumptives, one or both parents were affected, and Dr. Williams states that in 1,000 cases among the upper classes about one-half showed consumption somewhere in their family, and one in eight in the parents. The father is most apt to convey it to the sons, and the mothers to the daughters. The wife is more apt to catch it from the husband than the converse. Women are a trifle more apt to have it than men. Where consumption is inherited, it comes usually much earlier than in others, and especially is this so with females. Four out of five with galloping consumption show some family predisposition.

The kind of air inhaled, is an important factor in producing consumption. At the Brompton Hosp'tal it was found that of some 6,000 consumptives, two-thirds were in-door workers. Dr. Guy discovered that tradesmen living in poorly ventilated shops are twice as apt to die of consumption as the upper classes.

Those who live in damp, cold climates are specially liable to consumption, and consumption of a type which affects the bowels as well as the lungs. It is said that a malarial atmosphere in a measure precludes consumption, but the writer has not found this so. If you have a predisposition to consumption, and want to make it show itself, live on a clay soil. A sandy soil, with a substratum of clay, is all right, and few living thereon will have consumption, but death and destruction abound on a clay soil. Dr. Bowditch, of the United States, found that a damp soil produces this affection, not only in the case of towns, but of houses, those resting on clay furnishing consumption, and others on a dry sand being perfectly healthy. In Surrey, Kent, and Sussex the death-rate from consumption is very high. In some districts, according to Charteris, one person out of every four dies of consumption. As a general rule, one out of every seven persons has consumption. What care should all exercise who have any tendency to this fell disease. Far more insidious and frightful in its mortal inroads than cholera or the plague—for after a time those abate—consumption is tenacious, insidious, inexorable, deadly; it is worse than if the country were filled, as in India, with serpents, daily thrusting their cruel fangs into the fingers, and face, and feet.

Let us come still a little nearer home. By the hearth there plays a bright eyed, fair-skinned girl of, say, four or more summers; she is slender, and possesses remarkably keen perceptions; her eyelashes are long, and people say "she is too fair for earth"; her appetite is capricious, and her nights are broken by dreams, and rolling and tossing. We find consumption frequent among such children as these, as we do among the children who have had measles, scarlet fever, continued fever, &c. Those show a predisposition to consumption who have long necks, big ears, clubbed fingers, incurving nails, dilated nostrils, very fair and easily blushing skins, or the dark, muddy complexions of the bilious temperament. The chronic dyspeptic but too often winds up with consumption. The scrofulous, those with internal abscesses, the dissipated, have their faces towards consumption. If there is one thing more than another which slowly closes in upon those who continuously transgress nature's laws, to punish them with ulceration and death, certainly it is consumption. It follows a man beyond the grave, to the third and fourth generation. It seems the elder brother of syphilis, which will melt down a bone or a brain as heat melts a lump of ice. Consumption occurs at all ages, but is most frequent between twenty and thirty.

Now, what course should one with consumption adopt? What is the outlook? When a man is fast going down hill, he is naturally anxious to know where he is going. Consult the records of any hospital for the treatment of consumption, and the result will show how powerless it has been in many cases long neglected and deep seated. Cough mixtures, sage tea or picrotoxin for the sweats, acid and paregoric for the diarrhœa, are valuable, and make the patient more comfortable, but they do not save life. The consumptive must mark well the laws of health, and follow up the hints that are given from week to week. Moderate exercise should be taken daily; woollen under clothing (*e. g.*) Jaeger's or Gunthrope) should be worn; and the skin sponged every morning; the importance of this is very great.

The meals should be taken with the most scrupulous regularity; and if a full meal does not agree, the patient should eat less at a time, and oftener. The bowels and kidneys should be made to work systematically. Place most reliance on cod liver oils: Cod Liver Oil is excellent: but of all the preparations which improved pharmacy affords, we believe the consumptive and those with lung troubles of any nature will derive the most inestimable benefits from the Kepler Solution of Cod Liver Oil in Malt Extract. It is unequalled in its way, and is really the only proper way generally, to take cod liver oil.—*Health.*

Registered No. 182.]

THE INDIAN AGRICULTURIST.

A WEEKLY

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VOL. XII.] CALCUTTA :—SATURDAY, MAY 14, 1887. [No. 20.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 5TH MAY 1887.]

Bombay.—Rain in parts of the Deccan and Southern Mahratta country. Preparation for *khariif* sowing going on in ten districts. Scarcity of drinking-water and fodder continues in parts of Dharwar. Fever in parts of ten, cattle-disease in parts of eleven, small-pox in parts of seven, and cholera in parts of four districts.

Bengal.—Weather sultry, with storms. Showers fell in many districts ; but rain is wanted in Orissa and some of the eastern districts. Ploughing, and *aus* and *bhadoi* sowings in full swing. Sugarcane in good condition. *Boro* rice harvest proceeding. *Rabi* threshing and opium weighment still going on Public health indifferent. Cholera prevalent in several districts.

N.-W. P. and Oudh.—Weather somewhat unsettled. Storm accompanied by rain and hail reported from some places. Slight injury done to crops. *Rabi* harvesting generally completed and prospects good, supplies ample. Prices fluctuating. Public health fair. Cases of cholera, small-pox and fever continue to be reported.

Punjab.—Slight rain has fallen in the Rawul Pindee district. Fever still prevalent in the Hissar district. Small-pox and cattle-disease in some of the villages of the Nawashahr and Phillour tehsils, otherwise general health good. Prices falling in the Ferozepore, Umritsur, Lahore and Mooltan districts ; rising in the Umballa, Rawul Pindee and Dera Ismail Khan districts ; fluctuating in the Delhi district ; elsewhere stationary. Harvesting completed in most districts, crop outturn below average. Cattle starving in the Shahpore district.

Central Provinces.—Weather hot and windy. *Kharif* ploughings commenced. Fever and small-pox in places. Prices steady.

Assam.—Weather rainy. Planting of sugarcane commenced. Ploughing and sowing of *sali, dumai and murali* crops progressing. Prospects of *arhar* good. Tea doing well. Some cholera cases re-reported from the tea gardens. Otherwise public health good.

Berar and Hyderabad.—Reaping of *rabi* crops concluded Cholera still prevalent. Prices steady.

Central India States.—Weather cooler, with strong west winds. Scarcity of water. Cholera in Rutlam. Small-pox continues in a few States. Otherwise health good. Prospects fair. Prices falling.

Rajpootana.—Weather seasonable. High winds with dust. Tanks and wells drying. Threshing nearly over. Small-pox prevalent in two districts, otherwise health good. Cattle disease in Todgurh. Prices rising generally.

Nepal.—Weather seasonable. Prospects fair.

Letters to the Editor.

GUANO.

TO THE EDITOR.

SIR,—Can you, or any of your numerous readers, kindly give me some information as to the best way of procuring guano in India ; *i.e.*, whether it is obtainable here, or not ; and if so, where, and at what rate ?

KUMAR G. NARAYAN,
Supdt. of Agriculture and Forests.

Cooch Behar, May 3, 1887.

ROSES AND THEIR CULTURE.

TO THE EDITOR.

SIR,—It is not my intention to enter into a controversy with HORTUS on the merits of Mr. R. B. West's book on "Roses, and how to grow them in India," but your correspondent has made one or two statements which I cannot allow to pass unnoticed and therefore beg you will accord this letter a little space in your widely circulated journal.

I have been an enthusiastic cultivator of roses for many years, not only on the plains, but on the hills also, and therefore I think I am entitled to know a thing or two about rose culture. With this preamble, I will proceed to business. When I said that the book in question omitted to mention the various methods of cultivating the rose in different parts of India, I did "seriously think" that it was possible to include such information within the limits of a volume that professes to treat with *one* subject of horticulture only. For instance, Mr. West says that roses should be pruned in October and November : this applies to the plains ; whereas in hill stations the pruning is done in February and March. Where was the difficulty in adding these few words to the instructions upon this point ? Either Mr. West has never been to the hills, or knows nothing of gardening in those parts ; but considering that the hill stations are now largely resorted to, it appears to me that a little information on the subject would have been welcome. Secondly, when I said that the work was a comprehensive one, "so far as it relates to propagation, cultivation, soil, and other operations necessary to successful growing," I should have added the words "in Calcutta and Lower Bengal, generally." This makes all the difference in the world. The conditions of climate, &c., in Upper India and the hills, differ very much from those existing in Calcutta, as any one who has practised gardening in both places will know. It would, therefore, have been more appropriate for Mr. West to have restricted his book to Lower Bengal, if he has had no experience in other parts of the country.

On the subject of raising cuttings, HORTUS has quoted a formidable array of authorities. I can only say that Sir Joseph Paxton and Firminger (the latter the best authority in India) both recommend pure sand with a little charcoal to keep the sand from getting sour. I have tried everything in the way of composts, and found sand the best for raising not only rose cuttings, but cuttings of *every other sort.* I should, however, have qualified my reference to "English gardener," by adding the words "in India." I am surprised at HORTUS (who apparently knows something about plants) holding up the soil and system adopted in England as suited to the requirements of India. He is evidently a *tyro* at gardening, and his enthusiasm and championship of Mr. West's work would seem to have blunted his understanding a little. I have no intention of detracting from the merits of the book ; on the contrary, I think it a very useful and handy guide. But as Mr. West himself is conscious that the work is not free from many defects, I regard it as a kindness to point out some of them ; moreover, an author should not be too sensitive to adverse criticism. I pointed out such defects as attracted my attention in a hurried glance through the work. Doubtless there are many others, but it cannot serve any useful purpose to parade them in a daily newspaper. I am sure Mr. West is grateful to an impartial reader for pointing out errors and omissions. Why should HORTUS assume an air of injured innocence ? In conclusion, I may remark that poetical quotations, though very pretty in their way, don't prove facts.

J. T.

Editorial Notes.

We note that the Ceylon Pearl Fishery has realized Rs. 3,00,000. How much more will be added, seems to depend mainly on the full monsoon keeping off a little longer.

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An attempt has been made to grow opium in Tonquin by the French, and some Hindoo cultivators and an English manager were engaged for the purpose and sent there from Calcutta. The poppy is said to have grown well, and the first samples of opium were sent at the end of March last to the Resident-General at Hanoi.

We publish in another column a very sensible communication on the subject of Government grass farms. We entirely agree with the writer as to the necessity of taking up lands in every cantonment for such farms. The subject is well worth the consideration of Government, and we hope that before long the military authorities will see the advantages to be gained by the system proposed by the writer, in place of the present unsatisfactory state of the fodder supply of India.

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The report of the Cawnpore Experimental Farm for the kharif season of 1886 states that the experiments carried out confirmed in a remarkable manner the belief that deep ploughing is better than shallow ploughing for cotton, and that the effect of deep ploughing is greatly enhanced by manuring. Experiments with maize showed that the country way of sowing produces a heavier crop than the American method, though the single cobs obtained in the latter case were larger and plumper. Many of the farm experiments were however brought to an abrupt end by a heavy hailstorm at the end of October, which destroyed most of the crops.

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Our Darjeeling contemporary holds some exceptional views regarding the hill tea planter, and says :—" Although in our opinion Indian hill tea gardens—that is gardens from 3,000 to 5,000 feet elevation have nothing to fear from competition with Ceylon : still, there remains the fact that the production is increasing steadily ; and the Ceylon tea planter has plenty of 'go' in him, and pushes his produce in the open market or wherever he can. This the Indian planter does not do—and never did—so far as we know. Besides that, an Indian tea planter, as a rule, is far two conservative, far too much in the power of the agents, &c., and far too much in fear of the official—even if he is a policeman's servant. This is travelling a little out of the record, but the fact is this : with the really losing prices, Indian tea planters must stir themselves up ; and that, a good deal."

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Kuhlow's Review tells us that the German Consul at Saigon, has just sent home to the Commercial Museum at Frankfort, an elaborate collection of the export commodities of Cochin China, with an exhaustive account of the import and export trade. The articles he sends, dried and pressed buffalo skins, buffalo horns, fish and cocoanut-oil, india-rubber goods, fish bladders, pepper, lacquer, cocoons, silk, refined cotton, &c. &c., are all minutely described in the report ; prices, purchase conditions, export quantities, shipping opportunities, &c., also being fully gone into. In fact, Consul Speidel has left no stone unturned in his praiseworthy endeavour to lay before his countrymen the most minute particulars of the export trade of the country, so that they can see for themselves at a glance, whether it would benefit them to procure from Cochin China any of the commodities they now obtain from other remote lands.

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We have referred before to the attempt that is being made to establish the silk industry in the Madras Presidency. *Indian Engineering* announces that the trees, on the leaves of which the wild silk-worm feeds, are found in abundance in most of the districts, and the only question is whether cocoons can be collected or produced in sufficient quantity, and whether silk can be reeled from them there, or whether they could be sent elsewhere with profit. With this view some 500 cocoons out of the collection made for the Colonial and Indian Exhibition were sent for trial to Mr. Cleghorn, C.E., a gentleman in Bengal, who reels silk according to a patent process of his own invention. The cocoons had, however, all been pierced, and the result was therefore poor. But fresh and unpierced cocoons collected in the Vizagapatam district were more favorably reported upon and were considered as good as the Bengal ones.

We understand that the first auctions of the new season's tea were to have been held on Thursday last, the 12th instant, when it was expected that about 4,000 chests would be brought forward. Teas from the Darjeeling district and the Dooars are now arriving freely in Calcutta, and those from the latter are said to be good, useful samples. A small business has already been done by private sale to the extent of about 2,300 chests shipped direct to England. The outturn up to the present is somewhat behind that of last year, but the deficiency is being rapidly made up. Musters from Cachar, Assam, Sylhet, and Chittagong are arriving rather slowly, as until lately rain was generally wanted, but the latest reports state that good rain had fallen in Sibsaugor, Gowhatty, Silchar, and Sylhet, though in the latter district, accompanied by hail which has done much damage to some gardens. The quality of the musters already arrived, especially those from Cachar, shows a decided improvement over those of last year.

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Writing of silicate cotton or slag wool, *Indian Engineering* says :—" From practical experience it has become an established fact that air-confining, or porous bodies, are the best non-conductors of heat, cold, or sound. In the manufacture of *silicate cotton* the threads or fibres are blown into the receiving chambers in such a manner that they fall in all possible directions with relation to each other, in consequence of which there is no parallelism or common direction in the threads, so that the air spaces are angular in shape and microscopic in size. This formation of minute cellular spaces, at irregular distances affords the most perfect resistance to the passage of rarified air, influenced either by heat or cold, and has also the effect of breaking up and destroying sound waves. The great power of Silicate Cotton as a non-conductor, lying principally in its formation allowing of the harbouring of atmospheric air in finely bi-sected air spaces, it is of the utmost importance that these spaces should not be destroyed, as would be the case if the fibre were crumbled to powder ; and it is a noteworthy fact, that the fibre blown from Cleveland slag is the only one that will not calcine under the influence of either heat, damp, or pressure." Some of our readers might remember this substance at the Calcutta International Exhibition, where it was the object of much curiosity.

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The idea of crossing the wild yak of the Himalayas with the ordinary hill cow is a novel one ; but this has been done, and the result is certainly very satisfactory. A Darjeeling paper says :—" We saw a specimen of milk the other day which was out and out the best we have come across in India. The milk was very rich in cream and from 300 cubic centimeters of it, after standing for 24 hours, we got a splendid pat of rich butter, in colour and every other respect reminding us of the milk from an Alderny cow. The milk was sent to us to examine ; the animal from which it was taken is a cross between a yak and hill cow. She has been here since last September, and when bought had a calf apparently two months old at foot. All this time she has been giving milk steadily This is the first instance we know of even a half-bred yak living and thriving in Darjeeling, and we would feel much obliged to any of our readers who can give us any information on this point. The Bhooteas and Sikkim Lepchas say that the pure bred yak will not live within the leech zone. Why, they cannot say. We were always under the impression that, like the little Thibet sheep, they died from liver abscess, owing to the comparatively hot and decidedly moist climate. Anyhow, this half-bred yak has evidently thriven well here. Perhaps this experiment might be worth carrying out further ? "

OUR Lahore contemporary, in referring to the depression of trade in the Central Provinces during 1886, questions whether Mr. Fuller, the Director of Agriculture, is correct in tracing any relation between the failure in the rice crop, and the falling off in exports of wheat. A rice-eating population, says our contemporary "does not readily take to consuming wheat any more than the contrary is the case. A mistake which led to much useless expenditure in the Bengal famine of 1874, when rice from Burmah was imported in immense quantities to feed the wheat-consuming population of Northern Bengal. It is, however, more than probable that large exports of *juar* did supply the deficiency in the local food staple. *Juar* is cheap and nourishing and used to form the main food staple of the poorer classes before even *syces* and grass-cutters began to think they must have wheat to eat, and demanded a rise of wages in consequence." It is, we think, a fallacy to argue that a rice-eating population will not readily take to wheat flour in the absence of rice, and *vice versa*. When hunger gnaws at our internals, all scruples are set aside. We remember during the great famine that devastated Rajpootana in 1868-69, the people living on locusts which 'walked upon the face of the earth as a pestilence' and what is more, relished the novel food. Again the bark of a tree known locally as *khejra* (*Prosopis spicigera*), was extensively used as an adulterant of wheat flower, because the latter was so scarce. It is therefore idle to suppose that because a certain class of people are wheat-eaters they will necessarily refuse rice, when the former cannot be had. We have, however, always thought that the Bengal famine of 1874 was a gigantic farce, whereby many contractors became possessors of large fortunes. But that is now a thing of the past.

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A CORRESPONDENT from Agra has contributed a series of interesting letters to a local contemporary on the subject of Nankin cotton. We have reproduced these letters in another column, and for convenience, have run them into one. We recognise the writer from his initials; he is engaged in commercial pursuits, and being agent for an important textile firm at Agra, has had special facilities for gaining his information on the subject of cotton. The writer seems to think that the cultivation of *khaki* or Nankin cotton opens a very wide field for European enterprise; but we fear he takes an exaggerated view of the intrinsic value of this variety. If Mr. Ozanne, the Director of Agriculture, Bombay, is to be believed, it has no merit as to staple or yield, and his advice is that all atempts to force its growth (in the Bombay Presidency, at any rate) should be abandoned. In his report upon the department under his control for 1885, in writing of Nankin cotton, he earnestly asks that "no pressure may be brought to bear upon him to do more than experiment with this variety.' That, without the stimulant of the Government offer to buy up all cleaned staple at four annas per pound, "it is not likely to be grown at all." Now the Bombay Presidency may be said to be the home of the cotton industry of India, and such an opinion coming from that quarter cannot fail to carry weight with it. We are quite prepared to admit the possibility of this Nankin cotton yielding better results if properly cultivated in the N.-W. Provinces; and the suggestion thrown out by the writer, that Saharunpore would offer greater facilities for the cultivation of this variety, is worth nothing. The allusion to Saharunpore being situated "under the same parallel of latitude as New Orleans," is also important from a cotton-growing point of view.

THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 5th May, 1887:—Rain has been heavy in Assam, and a fair amount has also fallen in most districts of Bengal. Slight showers have occurred in parts of the Deccan and Southern Mahratta country and the North-Western Provinces and Oudh. Elsewhere the week has been rainless. No reports have been received from Madras, Mysore and Coorg, Berar, and Burmah for the week under notice. The *rabi* harvest still continues in Hyderabad and a few places in Bombay, the Central Provinces, and the Punjab, and threshing operations are in active progress everywhere. The outlook is still unsatisfactory in the Punjab, where there was no rain again during the week under review. *Kharif* operations have commenced in the North-Western Provinces and Oudh, and continue in Bombay and the Central Provinces. The spring rice harvest is being reaped in Bengal, and the sowings for the early rice are progressing in Bengal and Assam. Sugarcane is in good condition in Bengal and the Central Provinces, and is being planted in Assam and the North-Western Provinces and Oudh. Indigo prospects are favourable in Bengal, and the crop is being irrigated in the North-Western Provinces and Oudh. Cotton picking is approaching completion in Bombay. The public health is generally good, except in Bengal, where cholera is reported from several districts. Cattle disease exists chiefly in Bombay and the Central Provinces. In the Shahpore district of the Punjab the cattle are reported to be starving. Prices are falling in four and rising in three districts of the Punjab, and are fluctuating in the North-Western Provinces and Oudh. Elsewhere they are generally steady.

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INDIA abounds in bananas, or plantains, and it has been a subject of some curiosity to us why the fruit has never been employed in the distillation of a fermented liquor. The common prickly pear has been utilized for this purpose in Malaga, and with considerable advantage to the distillers. We suppose it is the absence of any attempt to utilize indigenous products due to a want of enterprise, and depreciation of everything Indian that it has never occurred to any one to extract alcohol from plantains. Other countries have not been so backward, however, for we are told by a contemporary that missionaries in the Congo region have discovered that a beverage made of bananas is a preventative of malarial fever; and adopting Paul's advice to Timothy, they take a glass of this drink at regular intervals for their "stomach's sake.' Acting upon this hint, the banana Liqueur Company have produced a beverage as commendable for its wholesome qualities as for its delicious flavour, and which has secured a popularity almost as wide as it deserves. The sparkling banana liqueur is prepared from Jamaica bananas, in either drink it will keep for practically any length of time. It can be used with equal advantage as an ordinary liqueur, or diluted with hot or old or soda water. Mixed with the latter it makes a delicious and—judging from the experiences of Congo missionaries—a particularly healthful beverage for hot climates. For the sterner temperatures of northern regions, including England, it will probably be best esteemed in conjunction with brandy or other spirits. So combined it makes a splendid punch—milk punch, it should be said, if Dr. Richardson's remark that "bananas resemble milk in their composition more than any other fruit or vegetable,' may be relied upon. The banana liqueur was sold with great success at the New Orleans Exposition in 1884-85, and again last summer in the West Indian Court of the Colonial and Indian Exhibition.

BOMBAY has also been having an exhibition of orchids, in combination with lilies and other plants, but unlike our local exhibitions, it was under the auspices of the Bombay Natural History Society. One of our Bombay exchanges thus describes the display:—"Through the energy of those who initiated the display, a very choice collection of plants and ferns was got together and tastefully arranged on tables placed in the centre and round the sides of one of the large rooms belonging to the society. It was satisfactory to notice that a number of the exhibits were in flower, especially the orchids. Among those who exhibited the latter class were Mrs. Douglas, Mr. J. K. Johnson, Mr. Chubildas Lulloobhoy, Mr. M. C. Turner and Mr. W. Lang, the two last-mentioned gentlemen showing some very fine specimens. Mr. A. S. Panday also had a very large number of beautiful ferns on view. The display of white lilies by Mr. E. M. Slater was the best in the room. Mrs. Chambers exhibited a very widely arranged basket of cut flowers; Mr. H. Knott was well to the front with a large selection of healthy plants, including some beautiful begonias. Mr L. R. W. Forrest also had a good selection of these plants on view. The exhibit sent from the Victoria Gardens, although not containing many varieties, was a very good one, the few pots of China asters

looking very well. A few choice calladiums were sent by Mr. W. J. Best, and were seen to advantage among the other plants. Among the other exhibitors were Mr. Cowasjee Dady Limjee and Mr. Justice Birdwood, who sent several varieties. Mr. Furdoonjee Merwanjee Banajee, Mr. N S. Symons, and special mention ought perhaps to be made of the evergreens sent by Mr. Grattan Geary, which entwined the walls of the room and helped to throw into relief the other plants. There were several other minor exhibits, but we have enumerated the most prominent. The other rooms of the society were thrown open and afforded an opportunity to those present to view the fine selection of insects, fishes, &c, collected by the society during the past two years."

FRUIT PRESERVING FOR INDIA.

It has been a puzzle to us why Indian fruits do not find a place in foreign markets. England, for instance, imports immense quantities of oranges from Seville and Malta, both for the table and for making into marmalade, which might with advantage be supplied by this country. This is, of course, only a single illustration. Now, there are fruits grown in this country which would find a very ready market in Europe if they were cultivated on an extensive scale for export, and treated in a manner to insure their reaching their destination in a fresh state. What is more delicious than a really good Bombay mango, or for the matter of that, any other of the scores of varieties of splendid mangoes grown all over the country? Then there is the lichee, than which a more delicious fruit is difficult to find. The pine apple, which in Calcutta can be had for half an anna each during the season, would surely pay to export to Europe. There are the beautiful oranges grown in Sylhet, Nagpore and Delhi, which sell at absurdly low prices. Apricots, in the hills, to be had for the mere plucking. Plums of such delicious flavour, grown in the N.-W. Provinces and the Punjab—Delhi and Saharanpore especially. Loquats also in the same places. The common *baer*; sapotas, pomeloes, and a host of others. Why cannot some enterprising firm take up this fruit-preserving and exporting business? There is an immense field open to any intelligent, enterprising man, which cannot fail to prove remunerative in the highest degree, if properly managed. We read in a contemporary that arrangements are being made to send a number of shipments of Tasmanian fruit to London. Now, why should not arrangements be made to send shipments of *Indian* fruit to London? If Tasmania can do so, surely India can! Our contemporary goes on to say :—" Great care is being paid to the packing, and it is hoped the experiment may result in a new future to the fruit-growing industry of the colony. We should be glad to see the occasional shipments of fruit to India from the colonies carried out with more method and regularity. Hitherto the demand has been limited, because the sale has been almost entirely restricted to the European community, but if the taste for the fruit were once popularised amongst natives, the trade would be well worth attention. In the same way, the Singapore fruit trade might be developed. The mangosteen, the most delicious fruit of the East, is brought to Calcutta by the crews of the steamers from the Straits, only in a very limited quantity, and packed in baskets, with the result that two out of every three are bad. Properly packed and regularly shipped there would doubtless be a large sale for this fruit. The Straits pines are also far superior to any produced Bengal, and come into season earlier. If private enterprise will not take the initiative, the Procurator of the Botanical Gardens might be instructed to arrange for a series of shipments." For ourselves, we should prefer to hear of fruit being shipped from, instead of to, India. There is not the slightest doubt that were the initiative once taken, this industry would develope enormously. With the facilities now offered for transit by steamers and railways, there ought to be no difficulty in sending large consignments of our indigenous fruits to Europe. California, sends pine-apples preserved fresh in cans to India. Tomatoes even, and plums are sent in this way to us and find a ready market here. This is really carrying coals to Newcastle, and brings out in bold relief the utter inability of our mercantile community to see their own interests. An impetus once given, it would only be a matter of time for the fruit-preserving industry to attain large dimensions.

The only difficulty we notice in the way of sending fruits in their fresh state, is that of *keeping* them fresh ; that is, not by boiling or any process involving their being cooked, but fresh, as plucked from the tree. But even this difficulty would now appear to have been solved, for the *Times of India*, in its issue of the 3rd instant, says:—"Some little time ago a lady addressed a letter to one of the Bombay papers asking for information as to any method for bringing down fruit from the hill stations fresh and in a state of preservation. The recent patenting of a process in Australia supplies an answer to her query. A firm of jam-makers and fruit preservers in Victoria have been in the habit of purchasing large quantities of fruit, in whichever colony it could be procured, boiling it, and then sending it to be made into jam in any of the other colonies according to requirements. This method of business was prompted by the fact that fruit if readily manufactured into jam and packed for retail sale, is met by a Customs duty in each colony, while fruit simply boiled escapes duty free. Looking round, however, for some method of obviating this inconvenient system, the firm was led, through a study of Pasteur's researches, to the discovery of a way to preserve fruit. This is by exposing it to the fumes of sulphurous acid. The fruit thus treated is packed in air tight cases and will keep perfectly fresh for a year or even longer, the acid effectually arresting the process of vegetable decay. When the fruit is required for use or for the making of jam, it has only to be exposed to fresh air or steam, and every trace of the sulphurous acid disappears. This method, so simple and so inexpensive, should certainly make a revolution in the fruit trade of the world, and there seems no reason why it should not be adopted on a small scale in India for bringing down hill station fruits to the plains in a fresh condition."

Here then we have a solution of the problem which should induce some energetic and business men to open up a system of fruit-preserving for the purpose of exporting the delicious products of our Indian orchards to Europe. The plantain, or Banana, which is so plentiful with us, and so much appreciated in England, might be experimented with as a beginning. It is to be had all the year round in Calcutta. As a general table fruit, we do not know of any other to equal it. It is a standard dish in every household in Calcutta, and is absurdly cheap. A bunch containing a couple hundred fruits can be had for eight or ten annas, or about one shilling. If a demand was created, there is no doubt that fruit culture would be largely availed of as an industry in this country. At present it cannot be said to have made any progress at all. It is confined to certain local areas, and beyond certain limits it ceases to be remunerative. For instance, it is a matter of some difficulty to procure Calcutta plantains at Allahabad, although the two places are connected by a railway, the distance being traversed in 22 hours. This is due to the utter absence of enterprise. Plantains, moreover, will keep for a great length of time without showing signs of deterioration, when plucked in a green state, although fully developed. As a matter of fact, *all plantains* are plucked in a green state from the tree, and allowed to ripen on the bunches, which are hung up for that purpose in cool, shady places, with plenty of ventilation. Then, again, we import immense quantities of jams, jellies and preserves from foreign countries. Why should we not *export* equally large quantities? Has any one tried making jams, jellies and preserves for export purposes? There is a very wide field open to any one taking up this industry on a large scale. It only requires a thorough knowlege of the business to make a fortune out of it.

THE 'LAL BAGH,' BANGALORE.

The Government Botanical Gardens at Bangalore are known far and wide as the 'Lal Bagh,' and we therefore prefer to designate these beautiful gardens by that name. It is many years since we were at Bangalore, but we retain a lively recollection of the beauties of the place. It must now be something worth seeing, if we are to take into consideration the

progress made annually, judging from the report for 1886 now before us. Not only do these gardens afford a beautiful place of recreation and enjoyment, but they serve the double purpose of an experimental station for the cultivation and trial of economic plants; and it is in this direction that the record of the past year's operations is most interesting. In this connection the superintendant apologetically expresses a hope that he may "be pardoned for the rather lengthy details which follow" under the general heading of the propagation and culture of plants, although we do not see that he has anything to be pardoned for, when we consider the importance of this branch of his work.

Very encouraging results have been obtained with the Ceara rubber tree, which the Superintendent states is well adapted to the climates of Southern India, especially Bangalore. "Its cultivation progreses so favourably, that every encouragement is offered to plant on an extensive scale." It appears that the tree sheds its leaves during the driest period of the year, being then in a dormant state, until the vernal showers excite growth again. It requires no pampered treatment, according to the Superintendent's experience, and grows very rapidly in vegetable mould. Although when planted in any ordinary soil at the commencement of the S.-W. monsoon, seedlings will shift for themselves, and require no artificial watering during the following dry season. In open land the tree attains an average height of 30 to 35 feet, with a diameter, through the branches, of 15 to 20 feet. It is therefore recommended that seedlings should be planted uniformly at 18 feet a part, each way. They are ready for the field at six months old when they are about 15 inches high. Planting should be done on a rainy day, or immediately after rain when the sky is cloudy. Large pits are not necessary, but the natural soil should be well loosened to the depth of a foot, so as to allow the young roots an easy passage in their early development. The seeds of this tree are exceedingly hard, and to expedite germination, they should be filed and soaked in water for three days previous to sowing. A better method is to make the seeds sprout before sowing; exactly as is done with rice seed. As soon as they germinate, which they will do within ten days, they should be at once planted in boxes of good soil and kept in partial shade. The parent trees in the Lal Bagh, says the Superintendent, are not yet six years of age, and have not yet been tapped for rubber; but it is intended to do so in the current year to ascertain the approximate yield from a single tree. Plants were distributed to some gentlemen for experimental cultivation, and favourable reports have been received from them. No less than 975 plants were distributed locally. Of the other species of rubber-yielding plants, the *Ficus Elastica* (India-rubber) was found to do well, although the demand for it is said to be *nil*. It is propagated by layers; and the Superintendent expresses surprise that planters have not utilised this tree more freely on their Estates, where, in addition to giving shade to coffee, it would yield a profitable product of its own. The *Landolphia Kirkii*, or African rubber plant, continues to thrive; but being of slow growth, a speedy commercial demand for it is not predicted, even if the milkey juice in it was more abundant than it is.

Among fruit trees, the Arabian Date tree received much attention. Off-sets and seeds were obtained direct from the Persian Gulf. The former are all—with the exception of six—doing well, while the latter have been distributed in various districts, and sanguine hopes are entertained of the trees becoming naturalized in Southern India. Dr. Bonavia, as usual, has been interesting himself in the subject. The Litchi apparently does well at Bangalore, and nearly a thousand plants have been raised from seed by the Superintendent. He, however, recommends gratuitous distribution of plants to encourage cultivation, as the demand for them is very limited. The Loquat has also been successfully grown from seeds taken by a gentleman from the Taj gardens, Agra. The Maltese Fig Cactus has been introduced, and is growing well. It is intended ultimately to graft it upon the common jungle fig cactus.

Of textile plants, the cotton received some attention. There are now six varieties being tried at the Lal Bagh. Of these, the "Bamiah," and "Uplands American," should, the Suprintendent says, be treated as annuals, as they are not nearly as productive in the second, as in the first year of growth. The Fiji variety, however attains to a large spreading bush, and is most productive in the second year of growth. But the bolls of this variety are so small, that it is not considered likely to commend itself to the native cultivator. The increasing European demand for vegetable silk induced the Superentendent to institute enquiries into the market prices obtaining for the indigenous product, and the probable cost of delivery from Mysore. Samples of silk-cotton from the *Eriodendron aufructuosum* (the Kapok of Java), have been favourably reported upon in London and Amsterdam. Considerable prices, the Superntendent understands, are even offered for the silk-cotton from *Calotropis gigantea* (Madar), and *Wrightea tinctoria.* Six varieties are mentioned as growing locally in Mysore, viz. *Bombax malabaricum*, (Seemal of Upper India), *Eriodendron aufructuosum* (Kapok of Java) *Cochlospermum Gossypium; Calotropis gigantea* (the Madar), *Wrightea tinctoria; Hoya viridiflora*, a common wayside weed in Bengal; and *Cryptostegia grandiflora*, a rubber-yielding climber.

The Mahogany has apparently taken very kindly to Bangalore, where it is said to be "perfectly hardy." The Superintendent says: "In its native country (the West Indies) this tree ascends to 3,000 feet." This is an incredible height for a tree to attain to. The mightiest *Wellingtonias* barely reach 500 feet, and they are considered the loftiest trees in the world. There must be some mistake about this. There are seven varieties of *Eucalyptus* under trial; but it is not stated how they are progressing.

There is one remark in the report under notice which ought to receive consideration in the proper quarter. It runs thus: There are so many useful plants at our disposal, that in my humble opinium some proper scheme should be organised by Government for their dissemination and practical utilization in suitable parts of the province." There were altogether over 5,000 plants issued during the year, of which nearly 1,700 were distributed gratis; and over 2,400 packets of seeds, of which 102 were issued gratis. The financial results show that the total expenditure amounted to Rs. 14,138, and the receipts to Rs. 2,660. Thus the net cost to the State on account of these gardens, including two Flower Shows, was Rs. 11,478, this is not quite satisfactory. The adoption of the proposal contained in the remark quoted by us above might improve matters. One reason assigned for the limited income from garden produce is that the local growth of business in all departments of horticulture in Bangalore has removed the monopoly of trade that the Lal Bagh once injoyed. It is now shared by all the florists and seedsmen, for which Bangalore is famous.

INDIAN TEA ASSOCIATION.

Report for the year 1886.

The last annual report of the Indian Tea Association discusses many subjects of special interest to those engaged in the industry, and deserving of a wider publicity than can be given them by means of a document which, at best, can have but a limited circulation. Before noticing some of the more prominent matters which engaged the attention of the General Committee during the past year, it is satisfactory to read, that the actual outturn of the crop of 1886 was 79,098,243lbs., showing a considerable increase in the late months of the year, as compared with the same period of 1885. Among the first subjects which engaged the attention of the General Committee, was that of improved communication with Cachar. The Chief Commissioner of Assam, whose attention was directed to the matter, sent the Association, a few days before the report was printed, sections, estimate, and a report on a proposed line of metre-gauge railway from Karimgunge to Silchar. It is suggested that this line, which will cost Rs. 31,06,132, should be taken up by some private company; but as the now steamer service is of no use above Fenchoo-gunge in the dry weather, this railway, if it ever becomes a *fait accompli*, would require to start from that point on the river instead of from Karimgunge. A joint representation on the question of delay in transit and delivery of teas by the Inland Steamer Companies was addressed to the Agents of those companies by all Agents in Calcutta of gardens in Assam, Cachar, and Sylhet. Both Companies have promised to do all in their power to prevent such complaints in future. The draft of a Land and Revenue Regulation for Assam, particularly as viewed in the light of a Reso-

lution of the Chief Commissioner, published in the *Assam Gazette* of April 3rd, 1886, seems to have exercised the planting interests considerably. The Cachar Committee, at a meeting held to consider the question, passed a resolution "strongly protesting against any occupancy or tenant rights being acquired upon waste lands which have been granted by Government to tea-planters and others." Messrs. Sanderson and Co., the Government solicitors, were also consulted and replied that as there was no enactment in force in Assam which sanctioned the acquisition of occupancy rights, no rights could be acquired in Cachar: but as it was not improbable that a right of occupancy may at some future time be conferred upon cultivators in Assam, the solicitors advised that "annual leases should be taken from all persons, whether garden coolies or not, who were allowed to occupy or cultivate land within the parts belonging to the estate." The next subject which came before the General Committee was the combination, among the members of the Steamship Liners Conference, to maintain the rate of freight for tea at £2 10 per ton, while the rate for cereals and other similar produce, shipped by the same steamer to London, was as low as £1 3 6 per ton, a disproportion which the General Committee thought should not prevail. The Steamship Liners Conference referred the matter to the London Conference, by whom the rate of freight for tea was fixed, and a meeting had been arranged between the Secretary to the London Conference, and Mr. Magor and Mr. Wahab as representing the Indian Tea Association, but no practical concession has yet been obtained. An experiment had been attempted to work up a business in Indian tea in Italy, but a proposition to open a large retail establishment in one of the first cities of America for the sale of Indian tea, by importing direct from Calcutta at the cost and risk of a Sylhet planter, with a subsidy only towards advertisements and establishment, had been negatived. The General Committee were, however, in favour of pushing the sale of Indian teas in Canada and the far north-west of America if some arrangement could be made with the Canadian Pacific Railway Company. Complaints had reached the General Committee of short weights in teas weighed under the present net weights system, and the London Wholesale Tea Dealers' Association had unanimously resolved to give notice that "next season the trade would only buy Indian teas upon the ordinary gross and tare system." It was hoped that the Tea Dealers' Association might be induced to reconsider their intention, which would not only involve delay in selling but expense to growers by necessitating the additional cost of, and risk of damage by, bulking in London Meanwhile the General Committee had issued a circular in which it asked all Agents to impress upon their managers the importance of carefully weighing their teas at the time of packing.

SOWING INDIGO.

A Sketch of Indian Life.

"Jemadar, I think we should commence sowing."

"The nights are still very cold, sir."

"True, but they will be warm enough by the time the plant is through the ground. How is the wind?"

No skipper on his quarter-deck is more anxious about the state of wind and weather than is the indigo planter during his sowings. The jemadar opines that there is no breeze. We have been having a strong west wind for several days past, but the preceding afternoon it died away, and at present the atmosphere feels still.

"I think there is a slight inclination to an east wind," I say a few moments afterwards, and I watch the smoke of my cheroot as I puff it upward. I am right; the smoke is borne by an almost unfelt current slowly towards the west. "Should a *dorus* set in, I will delay sowing no longer. It is about the time to expect it, and the heat has been increasing steadily for the past few days. Let us go and see how the *jatchings* are."

A *dorus*, be it known, means that state of the weather when an east wind blows in the morning and a west wind in the afternoon, the most favourable weather for indigo sowings, as the seeds germinate during it, healthy and strong. We leave the verandah of the house, where the foregoing conversation had taken place, and walk to the nearest part of the zeraut to study the *jatchings*—a technical word, half Hindostanee, half English, signifying "testing." It is applied by planters to the sowings by which they test the amount of seed each drill throws per bigah, until they regulate them all to throw one uniform rate. The *jatching* takes place several days before the regular sowings, and a few bighas of land are quite sufficient for the purpose. We reach the jeraut and see the young and tender plants spreading their two tiny leaves in the sun, in parallel lines about six inches apart. They lie close in the lines, and it is pleasant to see the regularity with which they have germinated.

"I think, Jemadar, as this plant looks so well, the cold of the nights cannot be too intense. The east wind is strengthening. To-morrow I will commence sowing. Send for all the zillah servants to come here in the evening, and in the meanwhile get the seed and drills loaded on carts and despatched to each division." My prognostication is verified. A gentle east wind prevails till near noon, when it dies away. The midday air is still, but warm, and about three o'clock the west wind rises and blows till the evening when it too dies away. The time for sowing indigo has arrived. I muster my forces in the evening. My assistant comes in for parting instructions, and all the zillah-working amlahs gather. Each zillahdar or head of a division has a certain number of drills apportioned to him, and I order him to keep them all well together and not scatter them about, and to sow steadily one village entirely before proceeding to another. Thus marching on in strong detachments, the different parties are to proceed, sweeping swiftly through the cultivation till all is done. Each division consists of 25 to 30 drills with several hangahs. Four bullocks and two drivers for each drill and hangah are necessary, so that with the zillahdars, several tokedars and peons, a very respectable force accumulates in each detachment. It is well, for company stimulates work. Each drill will go through two-and-a-half to three bighas a day, so that as I have four divisions I hope to sow all in a week. Besides the outside drills I reserve fifty for the factory zerauts dragged by my own factory bullocks. Thus my three thousand bighas will soon be covered. My assistant has another thousand, for which similar arrangements are made, though on a smaller scale. The route of each detachment is settled, so that I shall know where to pot the drills each day as I go my rounds, and various minor points are also disposed of, and then with many admonitions to the servants to be careful and zealous, we part in high hopes and eager anticipations.

The next day dawns beautifully clear. The east wind rises during the night, and in the morning is blowing pretty strongly. The air feels warmer than it has hitherto been in the morning, and glancing at the thermometer I see it is at 60°, a temperature quite high enough in the early morning to justify sowing. The rumbling of the drills as they are being taken to the zeraut is soon heard, and I sally forth to start them going. An indigo drill is a lumbering machine, such as is not, I believe, to be found elsewhere than in an indigo factory. It goes upon two wheels about two feet high, and the axle which connects them revolves with them, in a kind of trough. In this trough is the seed, and upon the axle are several smaller wheels, about eight inches in diameter, and six inches apart, which revolve in the trough and catch up the seeds in little holes which are drilled upon their edges. In front of the little wheels are several receptacles into which the seed is dropped as the wheels go round and the seed falls through a tube into the furrows below, which have been made by the shares of which there is one for each little wheel, worked in front of the machine. Ugly and cumbrous as the whole arrangement is, nothing has been discovered that works more satisfactorily. A busy scene awaits me on the zeraut. The bullocks, some yoked, some waiting patiently, are crowding about, the hurwars are here and there, some taking seed to the drills, some driving those which are ready, shouting and making that peculiar click with the tongue which seems indispensable to make the bullocks go. The jemadar is there, directing all, the zeratier, next in authority to him, and in charge of the whole zeraut, the lallah—also an experienced servant in indigo, who writes up the workmen's names, and who has great authority among them. The stately moonshee appears, to chat about the hopeful prospects: peons, cartmen, idlers, and all the numerous servants and hangers-on of an indigo factory are gathered about to witness the starting of the sowing. All is bustle and excitement, and at first utter confusion seems to reign. At length several of the drills are got into line and started. I watch the furrows that they make to see that they are not too deep, or too shallow. An inch deep is quite sufficient. Each drill, with its half dozen shares covers a space of about two-and-a-half feet, so that at last when we get the whole of them going, a large broad patch of ground is sown at every turn. The servants trail along by the side of them and they stream away, in picturesque order, far over the broad zeraut. About fifty bighas have been marked out as the first piece to be sown. The drills are watched eagerly and with interest by all. Even the moonshee forgets his dignity, and stoops to adjust with his own hand something that has gone wrong; for the drills are very apt to get out of order—a share does not strike the proper depth, or the little wheels get loose. And they have to be replenished with seed every now and then. After one or two rounds, the hangahs are set going, the furrows are smoothed down, and the sowing is done. Seeing that all is in proper order, I leave the zeraut, and with the jemadar ride off to visit the outside divisions.

Indigo lands do not lie all in one unbroken sheet contiguous to the factory. They are scattered over a vast extent of country, in patches, small or large, according as they may have been obtained by arrangements with zemindars or ryots. The jemadar and I therefore part company, he to visit one portion while I visit another. A long ride is necessary and the sun is high, and the air hot before I return to the factory. The east wind has lulled again. Looking at the thermometer as I enter the verandah I find it registers 80° in the shade; and in the afternoon the west wind rises again. My heart exults, for I have hit off the weather to a T.

I need not further dwell upon the process of sowing; suffice it that in about a week the whole of the cultivation is finished, and the young indigo begins to show above the ground. The delicate plant! It appears in two wee, tiny, pale-yellow leaves; bent down upon the stalk like a crook, but soon rising erect, expanding, and turning green in the sun's rays. In regular lines, field upon field, without a break—so close that in some places they touch each other—the little plants come up. It is a beautiful *jumma*, as it is called, and were planter's troubles over with the appearance of the crop, their troubles would be light enough. Day after day I watch its progress, for it is an anxious time. In a few days the first sowings turn into four leaves, another pair appearing crosswise upon the first. But before it all arrives at that stage the weather changes, the *dorus* ceases, and a fierce and raging west wind roars. Like a hurricane it blows, hot as the blast of the simoom. All things dry in its breath. The most forward plants, as they begin to throw out shoots into the next stage of their growth (seven leaves), get withered, and apparently dead. The moisture all dries up, and the heated ground kills some of the tenderest plants in a day. There is no remedy, and as I ride about over my cultivation, see the once flourishing crop grow sicklier and sicklier day by day. I can only sigh, and long for a change of wind or a fall of rain. For fully ten days this terrible blast continues. The temperature rises to over 100° in the shade. A few hours exposure to it makes the head feel baked, and one's hands and face scorched as by a fire. Cold water does not allay the burning feeling of the skin, and in a few days it peels off in thin flakes. All wood shrinks and becomes highly inflammable. Fires are rife, and daily I hear of whole villages being consumed utterly. The air is laden with hot dust, and in the afternoon, when the wind roars loudest, the sun is obscured by a thick haze. After 9 o'clock in the morning scarcely a human being is visible outside. Natives lie extended on their pallets in their houses, for eyes, nose, ears, and mouth get choked with the parching dust, and even breathing becomes difficult. I, in my bungalow, lying stretched under the *punkah*, feel disinclined for motion.

At length one morning, I find the gale slackening, and as the day wears on, to my intense relief it becomes fitful and gusty. As evening closes in, it lulls to gentle puffs and dies away in the night. Next morning the east wind rises and I try to be hopeful again. Alas, for my tender indigo! When I assemble my zillah servants, and have a statement written out, I find one-half of my crop is more or less sickly, and much has been blasted clean out of the ground. Our consultation results in a general and gloomy opinion, that we are utterly helpless, and can only watch the sickly crop to see what recovers under the influence of the humid east wind, and when rain arrives we must re-sow the fields where the plant has been destroyed. The second day of the east wind shows a change in the aspect of the crop. Small shoots appear among the withered leaves, and gaining strength, in a few days, much of the indigo that had a brown and dead in appearance recovers, and spreads a green tinge over the fields again, and is out of danger now, for the shoots bring it into the ten leaf stage, and it is then strong enough to defy all further west winds, or diseases whatsoever. Still the crop has been woefully damaged, and there remain many fields that are empty and thin. But from the ravages of a foe, more deadly even than the west wind, we have been spared. Caterpillars have not appeared! These pests attack the crop in the four-leaf stage, first. Small filmy nests are observed on the tender leaves, and further examining reveals that each nest contains one or more little caterpillars about a quarter-of-an-inch long. Whence the insects come that make these nests is a mystery, for they must exist in myriads, yet they are not seen, and so quickly is the nest woven and the creatures called into existence. I have seen a flourishing crop one morning, lovely as the eye could wish, and the next day it is covered with caterpillars. They soon grow, eating up the leaves of the plant, till they are an inch long, or more. The crop vanishes, in a few days perhaps, thousands of *bigghas* are cleared off, and the dreary prospect meets the planter's eye wherever he goes of lands glaring empty in the sun. Rain is the only remedy, for moisture to sow over again.

How we sigh for rain. Days and days pass, and none comes. The heat, though not so great as during that frightful west wind, increases steadily and becomes oppressive. But no clouds appear in the blazing sky. March passes and April comes in, the crop I have increases in size, and in the most forward parts I set the weeding going. But several hundred *bighas* have to be re-sown, and nought can help me but rain. Gloomy are my thoughts as I ride about, and find April swiftly passing, too, and I make up my mind to a bad crop; bad outturn, and no profits. At length, one sultry afternoon, I observe in the north-west a bank of clouds. I watch it eagerly. There is no breeze, but heat broods upon the parched earth, and objects seem to quiver in its intensity. The clouds rise slowly, dark, with a curved line defined. Nearer, and nearer they approach. Utter silence reigns in the atmosphere—not a twig moves, and birds are mute. Still the clouds seem far off, when in a few minutes, so swift is their pace, they come overhead gyrating and tumbling about. The breeze comes from them. Oh, so cool! Dust rushes through every nook and cranny of the house—but I care not for that. Away *I go*, and bareheaded enjoy the first cool moment I have felt for months. I get brisk with the bracing breeze. The rolling of the thunder soon announces the approach of rain, and now down it comes in huge drops, and thick, careering away in lines, while the trees moan and groan in the force of the gale. The bamboos twirl, almost touching the ground in their elastic dips. The tall *baur* trees bend like bows with their crowns of starry foliage. The sturdy and majestic *peepuls* roar amongst their heavy branches, and some unable to stem the force of the gale, are uprooted, and lie prone on the ground. Meanwhile I, glorying in the coolness of the revivifying breeze, am gaily pacing about and turning my face to the rain and wind. For two hours the storm blows, and the rain pours, and then it passes far away, and the sun, declining in his evening journey, peers out calm and big. The indigo looks beautiful next morning; green, fresh, and luxuriant, already it has grown. But I pay small attention to the secure crop. The moisture, though immediately after the rain exuberant, I know full well will not last long in the great heat, and my re-sowing must be all done in a day, or the chance of success is small. Throughout the country, every ryot's bullocks and ploughs are requisitioned and with ploughs rakes, drills, and every implement I can gather to turn up the soil, at work, I push on from early morn till night fall, sowing as hard as I can. The best sowings at this time of the year are broadcast sowings on the plough, for the soil remains soft and the moisture is retained longest. Drillings are not so good, for it is hard to break up the land thoroughly with drills after a heavy fall of rain. But I cannot choose, any way must I sow, and save time. And I rejoice in the evening to know that but little remains for the next day; and that is on land that has been too wet to touch. By noon of the second day all is done.

In three or four days the young crop appears above ground, for in the heat of April the seeds germinate quicker than in the early part of the season. I am happy, for a full crop meets my view everywhere. No west-wind comes again to blow it all away. Only for the first day or two, grasshoppers, which are in swarms, do some damage, but the crop is so thick that what they eat has scarcely perceptible effect, and when the shoots appear of the second pair of leaves they can do no more injury. Crickets also abound, and destroy some, but in fields few and far between. To make my joy complete, another nor'-wester comes in about a week, and the rain that falls secures the crop beyond all further harm. Pleasant are my feelings then, as time goes on, and I watch the indigo grow. No more fears oppress me. Weeding is the only process that is going on, and as May passes, and June comes in, happy anticipations fill my breast of a successful *Mahai*.

E. C. L.

Selections.

GOVERNMENT GRASS FARMS.

[BY A CORRESPONDENT.]

THIS subject has not received the attention from the intelligent public which it perhaps, deserves. Two causes may be assigned for this :—First the range of utility of grass farms is limited and second any improvements effected by them in the supply of fodder or in the cheapening of the market are not generally known or appreciated. Grass farms *per se* are not fated to work any great revolution in the supply of fodder for mounted branches or transport; and it is the knowledge of this it may be which has prevented any wide discussion about them being entered into by those whose experience entitles them to speak and whose opinions if expressed, would doubtless carry great weight.

It is now some five years since attention was drawn to the subject of the fodder supply of mounted corps British and native. Disputes were frequent between zemindars and villagers on the one side, and Government grass-cutters on the other —these disputes often culminating in assault and battery. It was imperative that some steps should be taken which would prevent this and among other proposed remedies, grass farms were sugggested. It would seem that a pretty general idea existed that all that would be necessary to obtain a fine crop of grass would be to take up a piece of land, enclose or otherwise preserve it; and then, when the rains came, bountiful Nature would, without assistance, produce an abundant crop of good grass fit for hay for horses. It is only necessary to look at the sides of railway lines to see the fallacy of this. No land could be more carefully preserved from trespass or graze than these strips; in fact, railway companies are liable to heavy fines if their walls or rails are found broken down and cattle straying on their land. But what sort of grass is found there? Only the coarsest of the indigenous grasses of India—*kse, kusa, et hoc genus omne.* There are, of course, patches here and there where excellent grass grows; but these are few and far between, and will inevitably decrease in number in accordance with the immutable law of survival of the fittest,—the fittest being in this case, the strongest and coarsest. The growth of the coarser grasses is a great deal stronger than that of the finer, sweeter kinds, and consequently the latter get crowded out. This process can be seen going on anywhere where an originally good plot of land has been preserved from trespass, but neglected as regards care.

This subject of grass farms may be considered under two principal heads.

(1). What is required *of* a grass farm for it to be a success?

(2). What is required *by* it?

The answer to (1) may be shortly stated to be a good, wholesome and pure supply of fodder, and in sufficient quantity to meet the requirements of mounted corps, British and native, and of the transport that may be located in the station, at a cost not in excess of what would, under the present system, be paid by Government for the feeding of these animals. That the former (a wholesome supply) is not procured under the grass-cutter system is a well-known fact. Anthrax has been traced to impure grass, and a case occurred at Bareilly in the early part of 1884, which was attributed to grass, and the whole supply brought in by the grass-cutters was destroyed. Veterinary Surgeon T. J. Symonds. F. L. S., in writing on this system, states, it is probably the means of introducing anthrax "into our stables through the roots and rubbish which constitute the chief grass supply of India;" and, again in speaking of the universal practice of grass-cutters washing their grass to add weight and colour to their bundles, "the evils of washing are manifold; but perhaps the greatest objection is the possible introduction of anthrax among the horses by grass being washed in water containing the organisms or spores peculiar to this disease."

Again the under-fed, and ill-cared-for ponies kept up by the "doubled bundle" grass-cutters are often the first to be attacked by glanders, anthrax etc; and thus unless very carefully and frequently inspected are a source of danger to the corps to which they are attached. The establishment too of grass cutters is seldom if ever complete; and the deficiency of grass has therefore, to be made up by purchase by the Commissariat Department. This means simply buying in the market which is necessarily expensive and as all grass taken to the bazaar is well washed at some stagnant pool it is subject to the objection stated above.

A last and a more telling indictment against the grass-cutter system is that at nearly every station the grass-cutter, on behalf of Government, steals the property of the zemindar. This irritates the native population; and the maintenance of this system of theft is a blot on the fair fame of the Government. This was strongly brought out before the Committee which sat in 1881-82 to investigate this matter, and in some stations—Agra, for instance—reached such a pitch at one time that for some months grass had to be purchased although there were grass-cutters present with their corps.

This grass-cutter system applies to mounted corps only—not transport—and more especially British. The native cavalry are allowed compensation whenever the cost of a horse's keep exceeds Rs. 13 8. Then again the unwholesome well-soaked bazaar grass has to be purchased, or the money obtained for compensation is spent in purchasing cutting and stacking grass' from lands near, rented for the purpose which should be done by the grass farm and could be so done easily, at a much less cost to Government.

Supply for transport stands of course on a very different basis. The fodder is arranged for and secured, year by year, by contracts at fixed rates; and so as regards it, the *raison d'etre* of a grass farm rests solely on the food supplied being better and, it is hoped, cheaper. That good hay is superior to the best *bhoosa* must be apparent to every one; since *bhoosa* is but the dried-up and wasted stalk of a crop which has thrown all its nutriment into its seed, while hay is, or should be, made of grass cut at its prime, *viz.*, at the time of flowering. Another great advantage would be the taking away from gomastas and others the incentive to starve the animals, and make money out of contractors for the fodder supply; as hay ensilage and green grass have a less marketable value than *bhoosa*.

Regarding (2)—As before pointed out, something more than mere preservation of land is required for a good grass crop. Some hold the theory that any land, poor or rich, will produce good grass; but this is plainly wrong. Grass, like all other plants, can only possess what it can obtain from the land, with the result that poor soil will produce only poor grasses, and, conversely, rich soil will give us good grasses. To ensure a perfect pasture, the land "must be clean, in good heart, well drained, and the surface be thoroughly pulverised—" at least, so says Mr. M. H. Sutton (of the great firm of seed growers, Reading, in a small pamphlet), than whom there can be no greater authority on this subject. Again, regarding *care*, he says :—" Weeding is always a matter of great importance even in 'seeds,' but much more so in a permanent pasture." Grass farms must, of necessity, consist of permanent pastures almost entirely. Hence preservation unaccompained by the necessary care will not produce the quality of grass we desire. Deep and thorough ploughing and cleaning must be the commencement of our operations. Then at the proper season, either sowing of grass seed of a kind suitable to the place, or planting of "doob," a grass which will grow and yield plentifully almost anywhere. Manuring with the plough, ing, and a good top-dressing afterwards must by no means be forgotten, and a rolling, too, to finish up with. Now, with the exception of weeding, the crop may be left to Nature. What we sow, that will we reap; and only the best grasses, such as *unjun*, *doob* and *janewar* should be put down. In after years careful weeding, and an occasional opening of the soil by a light ploughing, with plentiful manuring, is all that will be required.

Farms have been started on two distinct principles : (1) That of the *rukh* system; (2) that of farming cantonment lands. The latter would appear to have decided advantages over the former. The *rukhs* are generally some distance out of cantonments, sometimes as much as 25 to 30 miles. This necessarily increases the cost of the fodder on its arrival in the station, owing to carriage, and must tend to waste and increased expenditure from the difficulty of exercising due supervision. Cantonment lands, on the other hand, are situated where the grass is required, and are directly under the eye of the officers responsible for the working of the farm. The Umballa Farm is an example of the former, and Allahabad one of the latter. At the former station a heavy loss has been incurred, owing to the hay made being unfit for issue, At the latter station large profits have been made. There are, then, irrespective of the improvements to cantonments, more advantages gained by taking up cantonment lands than by spending large sums of money in purchasing *rukhs*. In Cawnpore a farm, started on the Allahabad system, has had great difficulties to contend with as they who know the dry arid soil of that cantonment can well understand; but, judging from a recent report on the farm, it has now begun to pay its way. This is as unfavourable a cantonment for grass farming operations as any; and yet, after a severe

struggle, it has surmounted all difficulties. What crushes farms at the outset is the very heavy rent to be paid for the land, which falls especially hard on the struggling enterprise at a time when all available money is required for preparing and planting the lands. A means of avoiding this is proposed later on.

The working of only five grass farms (at Rawal Pindee, Umballa, Meerut, Cawnpore and Morar) showed for 1884-85 a profit to Government of about Rs. 9,000. Allahabad claimed Rs. 17,000 for its profit; making a total, on the six farms in existence, of Rs. 26,000. And this is but the commencement. But it would be far preferable to see less account taken of the profit, and, instead, real steady efforts made by ploughing, manuring, cleaning, etc., etc., to improve the lands up to a high pitch. This means money; and as long as Government views the subject in the light of merely a saving of expenditure, no serious effort, with the consequent of large expenditure, is likely to be made by those responsible for the financial condition of the farms. Let Government look more to the practical result of the scheme with respect to quality and quantity of supply just at first, making it understood that they will not mind a loss at the outset if good progress be shown; and eventually fine grass lands will exist in every cantonment, and the saving will be far greater than it ever will be if the farms are cramped *now* or fear of showing a loss on the years' working. Any one, except perhaps those who have charge of the farms, who has had the opportunity of seeing the hay at present made by these farms, will admit that there is a very large margin still left for improvement; but farming experience is possessed by few who come out to this country, and cannot be picked up all at once. Let farms be started, and exist for five years at least, and then a fair judgment may be arrived at as to whether a really superior quality of fodder can be obtained from them and at a less cost to the State.

It is but fair that the first duty of cantonment lands should be to provide fodder for the mounted corps and transport stationed in that cantonment; and, considering that grass is far and away more healthy than crops in the neighbourhood of a station, the carrying out of this idea would be beneficial both to Government and the cantonments. It would, moreover, far from interfering with manœuvres, add for that purpose a large quantity of that which, formerly under cultivation, was impassable on account of the damage that would be done. Cantonments ought, then, to have a share in grass farms; and the Cantonment Magistrate, if unable to help in the working, might do so in affording the clerical and protecting establishments. No rent should be paid by the farm to cantonment funds, but the actual deficit in the working expenses of the cantonment, caused by the lands not being rented out to cultivators, should be guaranteed from the grass farm, as also a certain sum yearly from its profits to be sent in improvements, etc., in the cantonment. This would free the grass farm from the incubus of a heavy rent, and be no less, in fact, to the cantonment; while the profits made by contractors, middlemen and others, who hang about cantonment courts for pickings made in leasing out land, selling the dead trees and cuttings, fruit gardens, etc., would accrue to the State. The grass farm would still lease out fruit gardens, etc., but its dealings would be direct with the smaller purchaser, not through large men who sublet. The large amount gained by impounded animals would, too, become the perquisite of Government, and would, probably, pay entirely for the protection of the land.

It has been stated against grass farms that, though half-a-dozen have been in existence some three years now, the necessity for grass-cutters is as great as ever, and irritation between landholders and *sirkari* grass-cutters has not been allayed. But, surely this is not the fault of grass farms, but rather of the creeping, crawling mode of progression which Government so delights in where—this is only in six stations—grass farms exist, grass-cutters are also kept up, and, in some places, the farm is hampered and put to extra expense thereby. The reason for this is that, in the event of a move, the corps will require grass-cutters. But suppose that Government has at length perceived that grass farms not only improve the fodder supply, but are equal to it and are a source of economy, and that grass farms are started in all cantonments where mounted corps are quartered. It would, without doubt, be easy enough then to do away entirely with grass cutters and their wretched ponies. On every farm a large number of labourers would be always required, and, if permanent employment were promised, there would be no difficulty in securing sufficient men to enter into an agreement to proceed with corps from station to station (returning always to their own station on completion of that duty), and to go on active service on the usual increased rates of pay. Instead of ill-clothed, and under-fed grass-cutters' tats, Government should supply the necessary number of mules or ponies which could be used as carriage on an emergency. These would form an integral part of the corps, while attached to it, and should be inspected, etc., like the horses of the corps. Pensions and gratuities might be offered the men, as to the present grass-cutters, and would form an extra inducement to take service. We should not stop short at British mounted corps; native cavalry should be included. Compensation for dearness of fodder, etc., should be done away with, and grass should be supplied by the grass farm at rates to be fixed locally, having reference to the limit up to which a sowar feeds his animal at his own expense. In this, again, a large saving would accrue to Government.

(i.) Let Government start grass farms at every cantonment where mounted corps are stationed.

(ii.) Let grass-cutters be dispensed with.

(iii.) Let cantonments be paid no rent for the lands, but its actual expense be guaranteed from the grass farms, with an allowance for improvement.

(iv.) Let these farms be thoroughly and properly cultivated as such.

(v.) Let farm labourers be engaged to move with corps, and go on service with them.

(vi.) Let ponies for these men, when handed over to corps for a march, be provided by Government.

Were the above suggestions carried out, it seems likely that the difficulty of the fodder supply in India may be surmounted. —*Pioneer.*

FODDER AND FEEDING.

[By Dr. A. P. Aitken.]

It is well-known to farmers that the nutritiousness of fodders of the same kind varies very much; that, for example, the grass of one meadow will fatten a bullock while that of another will not; that hay made from one field may be much richer than that from another, although the kinds of grass don't differ much; and that hay made from the same field may be good or bad according to a variety of circumstances. An analysis of these different fodders ought to reveal the cause of the variations in quality, and one has only to glance at the large number of analyses of hay published annually both in this country and elsewhere to see how great is the difference in the composition of that standard fodder. The constituents are found to range as follows:—

Albuminoids	6	to 14	per cent.
Carbohydrates	35	to 55	,,
Fat	$1\frac{1}{2}$	to 5	,,
Wood fibre	20	to 38	,,
Ash	$4\frac{1}{2}$	to 9	,,

These differences, great as they are, do not nearly indicate the extent to which the feeding quality may range, for it is found that the digestibility of the constituents vary directly according to their abundance. The smaller the proportion of the albuminoid matter in hay the less digestible it is; thus, in the case of a sample of hay with 6 or 7 per cent albuminiods, only about 40 per cent will be found to be digestible; while in a sample with from 12 to 14 per cent albuminoids, somewhere between 60 and 70 per per cent will be digestible; so that the digestible albumen contained in hay may range from less than 3 to as much as 10 per cent or more. As with abuminoids, so with the other constituents of the fodder, although not in so marked a manner; but it is evident that one kind of hay may be twice or perhaps three times more nutritious than another.

There are various circumstances which affect the value of hay as a fodder. In the first place there is, of course, the kind of grass from which it is made. It is found that the different grasses which grow in our meadows have very different nutritive values, even when grown upon the same land and in the same season. The analysis of Mr. David Wilson, jr., of Carbeth, published in the last volume (1886) of the Highland and Agricultural Society's *Transactions*, by far the most elaborate and thorough investigation into the nutritive qualities of meadow grasses that has been made in this country, show very clearly how far even the best kinds of meadow grass differ in feeding value. To that paper the reader must be referred for full information on this subject.

In the next place, there is the nature of the land on which the grasses are grown. A strong fertile soil produces, as a rule, grass containing a larger proportion of albuminoid matter than a poor soil; and the same soil, when well manured, produces usually a grass, richer in albumen than when unmanured. I

way usually, because it frequently happens that heavy manuring, while it enormously increases the quantity of grass, does not at the same time improve its quality. It may be that the proportion of albuminoid matter is increased to some extent by the manuring, but it does not necessarily follow that that increase correspondingly improves the feeding quality of the grass, for there may be a far more than corresponding increase in the amount of woody fibre, which diminishes the digestibility of the fodder. Thus it is noticed that grass which has been heavily dosed with nitrate of soda, or with liquid manure, or grass which has been rapidly forced away with sewage, does not form so nutritive a diet as ordinary well-grown meadow grass. Besides being less nutritious, it lacks flavour, and stock do not eat it with much relish. The chief charm that it possesses for the farmer is its great bulk, but that also is deceptive, for an unusual proportion of its weight in the green state consists of water. For some purposes it may be more important to secure a greater bulk of hay than to obtain a smaller amount possessing a higher feeding quality, as, for instance, when a relatively large number of store stock has to be kept through the winter. The increased facilities that are now available by means of concentrated feeding stuffs to augment the feeding value of fodder may tend to make farmers less careful regarding the quality than the quantity of the rough fodder they produce; but unless where straw is very scarce it must be regarded as a mistake to sacrifice the quality to the quantity of hay and especially of meadow hay.

Good meadow hay is a choice and most nutritious fodder, and in order to obtain it at its best it is not only important that it should consist of the better kinds of grasses and be grown on good land, but it must also be cut at the proper season. It is a common mistake to allow grass to grow too long for the production of hay of fine quality. It is well known that hay made from grass cut early is far more nutritious than that made from grass which is cut late or allowed to ripen; but the temptation to allow grass to grow to its full stature before cutting it is very great, and it is especially so in this country where in most districts it is very difficult to win. It is well however, that farmers should be fully aware of the great difference in feeding quality between grass cut before flowering and grass cut after flowering or when ripe. In order to show this, a very instructive experiment was made at Hohenheim. A meadow was divided into three parts, one part was cut fully six weeks before the usual time of hay-making, another was cut nearly a month before that time, and the third was cut at the time when hay-making began in the district. The three kinds of hay were fed to sheep, and it was found that the first cutting contained in the dry matter of the hay nearly 20 per cent, the second about 12 per cent, and the third only about 9 per cent of digestible albumen. Had the third cutting been made a fortnight later, when the grass would have been full ripe, as it frequently is in this country before hay-making is ever, the deterioration in quality would have been much greater. Along with great loss of quality as regards albumen, there was a gain in the amounts of digestible woody fibre and carbohydrates, but that gain went only a very short way in compensating for the loss of albumen.

The chief difficulty we have to contend with in making hay in Scotland, especially in the higher districts, is the uncertainty of the weather, and this is the only other circumstance that need be here referred to as affecting the feeding value of hay. The value of hay and all other fodders depends upon the quality and quantity of the *soluble* nutritive matter it contains; and when hay is exposed to rain the soluble matter is washed out of it. So long as the grass is growing a superabundance of rain does it comparatively little harm, and even after it is cut the occurrence of rainy weather does not injure it very severely. While the stem and leaf remains unbroken it is fairly well protected; but after it has been tossed about in the process of tending, the broken and bruised parts of the plants from so many openings or leaks through which the sap of the plant exudes, and is capable of being easily washed away. Hay which has been exposed to wet weather in this way, may lose as much as one-third of its nutritive matter. It is the less soluble and less nutritious part that is left, and such hay is found to have a very much diminished amount of carbohydrates and a relatively very large proportion of woody fibre. This is found to be the case in ordinary meadow hay, but to a far greater extent in clover hay, for the soluble part of clover is very easily washed away.

What has been said of meadow hay applies even more forcibly to clover hay, for the leafy part of clover is the most nutritive part of the fodder, and it is very tender and liable to injury. Clover sustains a great loss in being made into hay on that account, for a considerable part of the dry leafy structure, owing to its delicacy and brittleness, crumbles into small fragments during hay-making, and never finds its way to the hay stack.

There is no way by which grass can be so profitably used as by consuming it in the green state, either by pasturing or soiling. In preserving it in any way whatever there is a certain inevitable loss of nutritive food material that must be taken into account. One of the chief losses to which hay is liable is the loss of a considerable proportion of the small clover leaves and the stems and leaves of the small but very nutritious herbs that constitute so much, not only to the nutritiousness, but also to the relish and tonic properties of meadow grass. Until a few years ago there was no way in which grass was preserved for winter fodder except as hay, and well-gotten, sweet-smelling hay is a kind of preserved fodder so attractive, both to man and beast, that he who possesses it is not apt to reflect what proportion of the total nutriment grown upon the field has been safely stored on the steading. It is only when, owing to adverse conditions, the quantity and quality of the hay is far from satisfactory that a farmer is prone to ask himself whether it would not have been more profitable to have cut his grass earlier and preserved it in the wet state instead of in the dry. In the making of ensilage he has the opportunity of so doing, and that method of preserving fodder possesses some manifest advantages which are rapidly bringing it into favour in many parts of the country.—*North British Agriculturist.*

NANKIN COTTON.

It is a common complaint that the one thing wanted for the industrial development of India is more openings for European enterprise. Natives seldom initiate, and the pioneers of every new industry have invariably been Europeans. I think I am in a position to show that there is a field hitherto untrodden by the latter which, if it does not hold out the prospects of an Eldorado, presents the much safer bait of an industry that from its nature can hardly be overdone.

I have seen lately some curious statistics of the world's consumption of cotton. It amounts to a total of eleven million bales annually, averaging 400 lbs., each. But, say the disciples of Manchester: "Great as is this consumption, it is not nearly a great as it ought to be. The world's population is quite able to consume thirty or forty million bales annually." I only give these figues to show what the best authorities think on the subject. As a matter of fact the Southern States of America have, in the course of less than a century, increased their outturn of raw cotton from *nil* to more than six million bales annually. This industry may truly be said to have advanced by leaps and bounds all through. But there are signs that the period of its greatest rate of development has ceased, and that competing countries need no longer fear that the American giant will crush his rivals. In 1859, on the eve of the civil war, the Southern States grew four million bales of cotton They now grow six-and-a-half millions, or an advance of 60 per cent in 28 years. This may be considered slow in comparison to the jump from eight bales in 1792 to four millions in 1859. It is a curious fact that in the course of the present generation the number of bales grown has tallied almost exactly with the number of the negro population. Before the war the slaves were put down at five millions. At present the negroes are said to number between six are seven millions. The coincidence between these figures becomes more striking when read by the light of a conversation I had with an American planter not long ago. He told me that the chief difficulty in cotton planting was the labour in picking the bolls off the plants, that the negroes could command their own terms for such labour, the price of which was the most costly item in the process of cultivation.

I take this to mean that the demand for labour has out-run the supply, and that until some boll picking machine has been invented (furnished with eyes to see the difference between worm-eaten bolls and sound ones) the negro will continue to command his own price. In other words, the increase in cotton-planting in America now depends on the increase of the negro population, which, though very rapid, cannot keep pace with the growth of the cotton industry on the same continent during the first half of the present century. Having, as I believe, shown that America, though a formidable rival, is one whose competition can be faced without extraordinary risk, I shall endeavour to prove that the cultivation of the variety known as Nankin cotton may be undertaken by Europeans in some parts of this country with the reasonable hope of profit.

The first thing that strikes the observer in connection with the cotton cultivation of India is the entire absence of European en-

terprise. Cotton is grown under every latitude from the Panjab to Tuticorin, but in no single instance that I am aware of, has any European seriously taken up the business of cotton cultivation. Many experiments have been tried with exotic varieties. New Orleans, Egyptian, &c., but these have been experiments merely; and have led to no practical result. The same may be said of the variety that heads this letter. It has been grown in jail gardens and so forth, but no one has seriously taken up the cultivation with the view of making a livelihood out of it. It is with the view of assisting any that may be disposed to do so that I make public the result of my own experiments in the past three years.

In July, 1884, I obtained some seed from the Cawnpore experimental farm, which I proceeded to sow in a compound adjoining the ravines of Agra. The soil was anything but rich, to judge by the difficulty I have had in keeping alive a small patch of doob grass in the same field. It was of course sandy, and had not, so far as I am aware, been cultivated for thirty or forty years. The only preparation I gave to the ground was to have it levelled, the surface being covered with mounds which I afterwards discovered to be very old graves. Some little time elapsed in these preparations, and by the time the field had had a couple of ploughings, July was at an end. To assist me I employed an ancient agriculturist who had cotton fields of his own, and he smiled at my folly when I told him to put down the seed on the 1st of August. I may remark that in this part of the country all the cotton which is not sown on irrigated fields, is put down with the very first rains that fall in the latter part of June and beginning of July. Irrigated cotton is put down much earlier, say at the end of April or beginning of May. In sowing on the 1st of August I had violated the first principles of Indian agriculture, as practised by the ryot of the North-Western Provinces. The result, however, proved that in spite of so bad a start, the cotton was quite able to take care of itself Early in October of the same year occurred one of the greatest falls of rain ever known in the upper portion of the North Western Provinces. In some district more than 20 inches fell in the course of a few days. The result of this deluge so late in the season was most disastrous to the cotton crops, the outturn being in some cases a quarter of what it would have been under ordinary circumstances. My Nankin cotton, which had had 15 inches of rain upon it appeared to suffer less than any other. The bolls were, of course, worm eaten (there were very few bolls in the country that were not worm eaten that season) but the plants were healthy, and showed that the greatest mistake made in the sowing was in scattering the seed broadcast, Unlike the indigenous Indian cotton, the Nankin is a bushy plant, and requires plenty of space between the rows in which it should be sown. My field was, in fact, spoiled by having too many plants, which hindered each other from getting light and air. But the bolls came in plenty all the same, and the staple, though damaged by worms, was quite good enough to manufacture into coarse cloth suitable for shooting suits.

In calling attention to the mistakes made in the cultivation of this field, it is scarcely necessary to point out that the plant proved itself much hardier than its indigenous brother in the same district. So far as I am aware, it would have been impossible for *desee* cotton sown in August to have tided through an October deluge and produce bolls afterwards The plants would have run into wood, but would not have yielded cotton fibre. My plants continued to yield bolls all through the cold season, and at the end of that time I forbore plucking them up, as a native would have done with his *desee* cotton. They lived through the fierce heats of May and June without any irrigation whatever, and to my delight put forth during the following rains an abundance of leaf and flower, that proved conclusively the plant had found its natural habitat. The second year's crop was better than the first, the staple was stronger and quite fine enough to be worked up into a lady's riding habit.

Another year's trial was given to the same plants. They again yielded, but not so plentifully as on the previous occasion, and their appearance justified the conclusion that either they or the soil were exhausted. Not a farthing was spent in weeding or irrigation from first to last, and the net result was a couple of hundred yards of serviceable cloth in return for a few pounds of seed scattered broadcast in a field that had been fallow for a generation! No manure had been used; in fact, the view I took in making the experiment was this: "The Indian ryot, if urged by an over-zealous collector to grow *khakee* cotton, will be sure to sow the seed in his worst field, and neither weed nor irrigate the plants. I will do the same, and see if they have vitality enough to stand such treatment. A rough test of this sort is far more likely to decide whether the plant is capable of being naturalised, than elaborate experiments carried out under conditions impossible of application when the circumstances of the country are taken into account."

In my opinion the humble experiment I have made decides this question in the affirmative, but there are certain drawbacks to be taken into account.

The difficulty about the growth of this staple is the belief, more or less general, that it has a tendency to revert to the ordinary type of Indian cotton. The value of Nankin, or *khakee*, cotton depends entirely on its colour, which is quite unaffected by any number of washings. A permanent colour by no means unattractive in appearance is certain to add immensely to the selling value of any cotton. Let alone the demand for it which exists for military and sporting purposes a yet wider range of usefulness is open among the fair sex. A practical illustration of this was given the other day by a native cloth merchant who has extensive dealings with Europe, and supplies most of the requirements of the residents of this station. This man who, by dint of long experience has learned to gauge the tastes of the Anglo-Indian community in the matter of dress, offered to take off my hands any cloth woven of *khakee* cotton I might possess. In short, when made up with suitable trimmings, it forms a dangerous adjunct to the shafts that the fairer portion of humanity prepare for the overthrow of the sterner sex. Such being the case, it will be a thousand pities if a colour so suitable to the purposes of Love and War should show a tendency to rapidly degenerate into commonplace white. I am not able to answer this question decisively; the indications I have seen, seeming to point both ways. So far as I can judge there is no difference between the colour of the first year's crop and that of the third. At the same time it is absolutely certain that white bolls are to be found occasionally, actually growing on the same stalks as the *khakee* coloured ones. It is difficult to understand how this comes about, but a Darwinian may be tempted to regard it as an illustration of the theory that all diversities of type are due to occasional divergences from a common origin. Whatever the cause, it *khakee* cotton shows a tendency to degenerate to white, the cure must be found in the importation of fresh seed from China. It is too soon, however, to assume, as a matter of certainty, that this must be the result of its continued cultivation in this country. Another difficulty that will beset the European grower of *khakee* cotton is the absence of any guarantee that he will be permitted to enjoy the fruit of his labours. The Scriptural expression about sowing for other men to reap is to be seen every day in this country. In plain English thieving is carried on to an alarming extent, and not a family would reap the bolls off their own cotton plants unless they kept watch over them day and night. This I know from personal experience, for many a time and oft have I heard the shrill voice of an old woman warning off intruders from fields in which the bolls were beginning to burst. So long as *khakee* cotton is not grown by the natives the danger of theft is minimized, but if it should come to be generally adopted the European would have a hard time of it in protecting his fields from invasion. Ditches and fences would become absolutely necessary, and they are already pretty common among the fields of cotton and sugarcane that are sown by irrigation. In short, a higher style of agriculture would have to be adopted to make the cultivation permanently useful, and I believe the results would astonish many who think they already know a good deal about cotton growing in India. That, under exceptional circumstances, a field of the ordinary *desee* cotton can yield 400lbs. an acre, is a fact I found out long ago from—a punkah coolie! In a moment of confidence he told me the exact quantity of *kurp*[illegible] (cotton in seed) he obtained from a field whose dimensions he knew and though the area was small, as far as I can remember much below an acre, the yield was in the proportion I have named. He told me that the yield was quite exceptional, and due to the soil being very rich and well manured. Of course it was irrigated In fact to sow cotton on unirrigated land in this part of India, is almost a waste of time and labour, but in the absence of wells and bullocks what is to be done. Year by year, unless I am greatly mistaken, the ryots are increasing the area of their irrigated fields, and it is only a question of time as to when the whole of the North-West Provinces will be protected by wells. For a European to engage in cotton planting it will be necessary for him to assume from the commencement that his fields should be irrigated, and he should therefore select a district in which irrigation can be most easily effected. I am not in a position to speak authoritatively on the subject, but in my opinion Saharanpore should offer greater facilities to the European than any other district in the North-Western Provinces. The staple already grown there is longer than any to be found in the districts about Agra, and spinners give it the preference.

It is therefore reasonable to assume that *khakee* cotton grown there will be superior to the same variety grown elsewhere. It may not be known to some of your readers that Saharanpore is under the same parallel of Latitude as New Orleans. So far as climate goes, it should be second to none in India for the purposes of cotton growing; the soil is rich—witness the noble trees on the Dehra-Saharanpore road—and water seems to be near the surface. With these advantages it should fare better than in the dry, burnt-up plains about Agra, which continue to grow an ever-increasing area of *desee* cotton. Were I 30 years younger I might be tempted to try the experiment of carefully attempting the growth of exotic cotton at Saharanpore. Failure, in previous attempts, is no proof that success does not lie in the future, and with the number of young Englishmen seeking employment such attempts should be repeated. Capital is forthcoming for much worse ventures, bogus gold mines, and so forth, and it would be better for all, if some of it would take the direction I have indicated. I may conclude by saying that I do not possess an acre of land in Saharanpore, and can write without bias, if without sense.—"Agra, J. A. G. G." in the *Englishman*.

THE CULTIVATION OF A WOOD FOR TEA BOXES.

I have been travelling for more than two months through the northern part of India in order to study forest vegetation from the point of view of a forester and botanist. This I was enabled to do with the greatest profit through the kind recommendations of Dr. Schlich of Cooper's Hill and Mr. Ribbentrop, Officiating Inspector-General. I must say that I have not seen many forest in Japan or America more beautifully stocked with magnificent and useful trees than the broad-leaved forest of Sikkim or the coniferous forest of the N. W. Provinces. I cannot remember all those fine forests without thinking most thankfully of the gentlemen who are in the envious position of studying and working them, and who have not spared time and trouble to show me their forest and the results of their hard work. I may be allowed to mention here Mr. Home and Mr. E. G. Chester, of Darjeeling; Messrs. Fisher, Smythies and Hearle, of the School Circle, to whom I say "good bye," through this paper, thanking them most sincerely for their unlimited kindness.

On my way through the Terai and the hill forests of Darjeeling, I have been told that the scarcity of a timber wood fit for tea boxes is getting more and more felt, owing to the waste of the various timber trees on private ground. It seems to me a suggestion worth considering would be to propose that the Government should try to cultivate on a large scale a wood for the above-mentioned purpose.

To do that in the quickest, cheapest and surest way, I would recommend the Japanese *suji* (*Cryptomeria*) or as I will name that tree, the *Sequoia japonica* for the hills around Darjeeling, and the *Paulownia imperialis*, or the Japanese *kiri*, for the plains and lower hills of the N.-W. Provinces and the Punjab.

In Japan, the "*suji*," or Japanese cedar, is, largly cultivated all over the whole empire, but the localities where this tree is found growing wild are but few, scattered over the main island "Honshin," and these places are rarely seen by any European. There is a mountain north-west of the lake Biwa in the centre of Honshin, covered with large *suji* trees, evidently wild. There is a broad belt of beautiful forest near Akita, about a fortnight's drive from Tokio, beneath the 40th degree of North Latitude, the winter climate of which country is marked by deep snow for four months, and a temperature, which several times in this season falls to 10° below freezing point. There the *suji* forms a splendid mass of forests, partly to the exclusion of every other tree, partly together with *Quercus crispul a glandulifera, serratta, grosseserrata, Fagus sylvatica, Magnolia, hypoleuca Æsculus turbinata* and many other trees, but never is the *suji* found growing together with another conifer, unless one be planted with it. In such places the *suji* attains a height of 150 feet and a girth of 6 feet and more. The tree is also said to be a native of China, and from that country the first seed was brought to Darjeeling, by Mr. Fortune, who was sent by the Indian Government to bring supplies of the best kind of the Chinese tea plant. In both Japan and China the tree is usually planted around Buddhist temples, where the finest specimens, towering up to a height of 250 feet (Koyasan), may be seen.

A few years ago some travelling botanists suggested that the *suji* is no Japanese tree at all. Being brought from China by Buddhist monks together with the *Gingko, biloba, Sciadopitys verticillata, Pinus koraiensis, Cunninghamia sinensis Podocarpus Nagi matrophylla* and many others; but a careful examination of the Japanese forests, from the 35th degree to the 42nd degree, a trip which will take about six months, will show, that only *Gingko* and *Cunninghamia* can be traced back to China.

The economic value of the *suji* in Japan is very great; growing there in all situations and soils in deep, damp valleys, as well as on high mountain slopes; it is one of the commonest and also one of the most useful of Japanese timber trees.

The sapwood is whitish yellow, from 2 to 3 inches broad and is, when beams or boards are wanted, generaly not removed from the dark reddish, sometimes black-bluish, striped heart-wood. The wood is very light and soft and is used for all kinds of carpentry, amongst the comfortably situated people; the slight resinous smell of the fresh wood soon disappears.

Owing to the frequent occurrence of earth-quakes and disastrous fires, which often lay waste a town with 3,000 houses in a few hours, the Japanese use quantities of wood in house-building.

For that purpose the cheapest timber in the shortest time is produced by the *suji* which is profusely planted all over the empire, and at the age of scarcely 25 years, the trees are cut down and shipped to the market.

The almost exclusive method of propagation used in Japan is, from a forester's and botanist's point of view, very interesting and important, all plantaions being made by *cuttings*. That is not at all surprising, if we bear in mind that the American "big trees" are *Sequoas* too, and coppice as freely as the Japanese ones if cut in an early age and in healthy condition. I remember even a great number of *Sequoia sempervirens* stumps more than 700 years old, perfectly covered with young and very rapidly growing shoots. Close by Kioto the ancient capital of Japan, is a small forest of *suji* entirely worked as coppice with a rotation of 20 to 25 years.

For propagation of the *suji* the terminal piece of every branch is used 1½ to 2 feet long. The plantation in the ground must be made immediately before or at the beginning of the rainy season. The Japanese usually put the cuttings 3 to 5 inches deep in the soil forming a narrow hole of this depth by a wooden stick of about the same thickness as the cuttings; the young plants grow very rapidly after having made plentiful new roots during the rain. This method is preferred to sowing, the young suji seedlings being tender and easily killed by excessive heat or frost. The *suji* yields a wood that seems to me very well suitable for tea boxes. I am confirmed in this view after having seen tea boxes made of this wood in Darjeeling itself Such a box was shown to the office of Mr. Home, Conservator of Forests for Bengal. Besides that I am inclined to encourage the plantation of the *suji*, because this tree apparently grows well in all the different kinds of soil and exposures from the Terai up to the region of the silver fir.

It would be quite easy to grow within a period of from 30 to 50 years, wood of the quality and dimensions required for tea boxes, the manipulation of planting this tree being very easy, cheap and sure, if made in the way and at the season above pointed out. In case these lines may induce some experiments, I will add, the young trees must be planted rather close together, scarcely 4 feet apart; for only in a dense growth does the *suji* soon lose its branches and produce a clean, straight and valuable bole.

The other trees, which I have in mind as timber-yielding trees for tea boxes, is a board, leaved tree, *paulownia imperialis*, called "*kiri*" in Japanese, which produces a wood still lighter and more quickly growing than the *suji*, but as Dr. G. King, Director of the Royal Botanical Garden, near Calcutta, tells me, this tree does not grow well in the wet climate of the Eastern Himalayas, though possibly the north-western plains and hills might suit it.

The wood of *Paulownia* is largly used in Japan, for boxes of every kind, for furniture amongst the better situated classes, and which are in common use throughout Japan, and which the ladies use varnished and dressed after the newest fashion.

This tree is planted in the villages together with mume (*Prunus Mume*) nanten (*Nandina domestica*), kaki (*Diospyros kaki*), &c., as a shelter for the kitchen garden or in other accessible places. When the seedlings are two years old they are cut off close to the ground and the new shoots grow straight up to a height of 10 feet or more without a branch, in a single year.

In favourable conditions (deep soil) the tree easily attains a girth of 3 to 4 feet within 10 years, the dimensions seem to be sufficient for making tea boxes. In Japan the tree is sawn off every 8 or 10 years, very close to the ground, and the stool is cleanly cut with a sharp knife. The shoots of the following year grow rapidly, and attain even larger dimensions than those mentioned.

As far as I can judge from comparison, the drier climate of the N.-W. Provinces and the Punjab, with an average rainfall of from 20 to 50 inches per annum may prove suitable to this useful tree, which stands even a good deal of frost. It would be a pleasure to me to provide the Forest Department with seeds from Japan, if my suggestions seem worthy of being considered and proved.

Heinrich Mayr, Ph. D. at Oec. publ. Dr.,
Lecturer in Forest Botany at the
University of Munic

NITRATE OF SODA—HOW TO USE IT.

We may be pardoned if we give a few plain statements regarding nitrogen, before entering on the subject proper of this article. All animal and vegetable manures owe their value in a great measure to the presence of nitrogen in combination. while in living animals or plants nitrogen exists as a constituent of albumen, casein, fibrine, legumin, and gluten. In the process of decay and decomposition, the nitrogen is relieved from its organic combinations and converted first into ammonia, and subsequently into nitric acid. As was casually reverted to by Mr. Harris in his article on nitrate of soda, published in our issue of February 9, the change of ammonia into nitric acid is largely accomplished by the action of minute organisms in the soil called "bacteria," or "nitrifying plants." These organisms, like the yeast fungus, act as ferments bringing about a combination between the ammonia of the soil and oxygen forming nitric acid.

Mr Warrington, a noted agricultural chemist, has pointed this out in confirmation to the researches of Schloesing and Muntz.

Nitrates are of extreme importance, says Masters, in his Plant Life "Inasmuch as nitrogen is an essential constituent of protoplasm—without nitrogen there can be no protoplasm, without protoplasm there can be no plant.

Nitrate of soda, the sodium nitrate of chemists is imported chiefly from Peru, where it occurs in beds sometimes 7 to 8 feet thick, preserved from solution by the extremely arid character of the climate. The source is said to be practically inexhaustible

Refined nitrate of soda as imported contains only about 5 per cent of impurities and may be purchased in Chicago at about $3 75 cents per 100 pounds or thereabout according to the fluctuations of supply and demand. In large quantities the price would be lower Few fertilizers act so rapidly when judiciously applied. Being exceedingly soluble and thus apt to be washed through the soil it should be used exactly when wanted. The most desirable time to apply it is just before rain and when the plant is weaning it self from the parent seed and seeking for the first time nutriment from the surrounding soil At this stage in the life history of a plant there is the most danger. Adverse weather may so weaken it that it is unable to bridge over the period between mother milk and found food and death ensues, or it may come through its stunted and fragile. At this stage therefore, when the cotyledon leaves are followed by the true leaves, nitrate of soda is of most use. Whatever amount the farmer or market gardener decides upon using should be divided into, say, three parts, these to be used as follows: One part before, one part at, and one part after the weaning period. The quantity used for field crops, such as wheat and other cereals and all pasture and meadow grasses —for it exerts the strongest influence upon gramineous herbage—is small 80 to 100 pounds being sufficient for one acre of land.

The market gardener may, where very early crops such as cabbage are required, use as high as 400 pounds per acre with splendid results. The farmer should only use the nitrate in conjunction with farm yard manure. The nitrate for starting and the common manure for carrying on the crop. It is more than doubtful however, whether the time has yet arrived when the western farmer is justified in going to the expense of applying high priced artificial manures to field crops.

The nitrate when used should be distributed broad cast and very evenly so that the best results from its application may be obtained. Used on small fruits we would make a small application as the plants were first starting in the spring and another after the fruit is set to help its full development.—*Farmer's Review.*

NITRATE OF SODA: ITS USE AND ABUSE.

[By Cambuslang.]

Notwithstanding the low price of grain in recent years, the cereals, as a rule, will give a better return for nitrate of soda expended on them than most farm root or fodder crops, because the use on the former of a small quantity of nitrate of soda has more effect on the crop than it has on the latter. Under ordinary conditions, 32 bushels of wheat contain as much nitrogen as is contained in a ton of average hay, both of which are indispensable articles of food, and it is questionable if in any locality the hay is of equal value to the wheat, and in many the latter would be double or triple the value of the former; so that discretion must be exercised not only in applying nitrate to crops on which its influence is felt, but such crops must be principally chosen as yield a high-priced product if the most is to be made out of the money expended. By referring to the records of the Broadbalk field of the Rothamsted experiments, which has been under treatment for forty years, and continuous wheat cultivation for thirty-five years, it will be found how strong an influence nitrate of soda has on the growth of wheat and the money returned for nitrate of soda so expended. During all the time the field has been under experiment, all manures applied and crops reaped have been methodically weighed and recorded, so that they may be taken as facts as far as that district and class of land is concerned. We there find that plot No. 5, having an ample and regular supply of all the requisite mineral manures, has produced, for an average of thirty-two years, 15½ bushels of grain and 13⅓ cwt. of straw per acre; whereas plot 9*a*, getting the same minerals and 550 lbs of nitrate of soda, has produced an average of 36½ bushels of grain and 41⅞ cwt. of straw. Here we have a gain of 21 bushels of grain and 28⅜ cwt. of straw, for an expenditure of 550 lbs. of nitrate of soda, which is equal to about 4¼ bushels of grain and 6 cwts of straw for each 112 lbs of nitrate of soda used. At present market value we therefore get 4¼ bushels of grain and 6 cwts. of straw for an expenditure of little over 10s the straw itself in many districts being worth over twice this value. This is not all, for the expenditure of nitrate of soda is here excessive and even with a good season it cannot all be utilised; and had a smaller quantity been used and applied according to the rules previously given, the results would no doubt have been more successful. Rothamsted is situated in a district dryer than the average of England, and the soil is quite suitable for applying the heaviest of manuring; but, in my opinion, the climate is scarcely dry enough for economically applying such quantities of manures as 550 lbs. of nitrate of soda at one time; and as far as I am aware, no attempt has ever been made to apply the very soluble manures in small and repeated doses, according to the season, the consequence being that in wet years, similar to the last ten, the drainage of the plots to which nitrate of soda has been so applied, show an enormous excess of nitric acid. Being an experimental station, fixed quantities must, of course, be applied.—See *Journal* of Royal Agricultural Society of England, on the drainage waters at Rothamsted. Vol. 28. part 2.

At Woburn, which is a newer started station than Rothamstead, and where exhaustion has not reached so complete a stage, it will be found that plots 4, 8*a*, and 9*a*, manured in 1882 with minerals, yielded an average of 13½ bushels of grain and 18¼ cwt. of straw per acre; while analogous plots manured with 275 lbs. of nitrate of soda per acre yielded 32·8 bushels of grain and 39 cwt. of straw per acre, being 19½ bushels of grain and 20 cwt. of straw, for an expenditure of 275 lbs. of nitrate of soda. This result gives nearly 8 bushels of grain and 8 cwt of straw for every 112lbs. of nitrate of soda used, which is nearly double the results obtained at Rothamsted, when 550 lbs. were used. At Woburn, when 550 lbs. of nitrate of soda were used, as on plot 9*b*, the yield is much the same as at Rothamsted, a return of a little over 4 bushels of grain and 6½ cwt, of straw being obtained for an expenditure of each 112 lbs. of nitrate of soda. With the same expenditure of manure, ½ bushel of grain and ¼ cwt. of straw were produced extra at Rothamsted, results which may be considered practically identical seeing that the soil at Rothamsted is a stiff clay, while that at Woburn is open, sandy soil, the one of course being well suited for wheat, the other only middlingly so.

The excessive loss caused by the use of very large quantities of nitrate of soda is here very clearly shown: the smaller manuring giving nearly double the quantity of grain per acre, per cwt of manure used, that the heavier manuring does, so that the lessons to be gained by a study of the results are clear and distinct.

Taking nitrate of soda at 10s per cwt, wheat at 4s per bushel, and straw at 50s per ton all of which may be considered present market values over the British Isles, we here get—

8 bushels of grain at	...	...	... 4s 0d = 32s
8 cwt. of straw at	...	...	... 2s 6d —20s
Total ...	...	...	... —52s

for an expenditure of say, 10s on one cwt. of nitrate of soda applied to land under continuous wheat cultivation; no special precautions being used. Had the most improved method of cultivation been used and the manure applied been regulated by the wants of the crop for each particular season, as would be done in ordinary farm practice, and had the land after the blooming of the grain been clothed with growing vegetation, to be turned into manure for the succeeding crop, I have no doubt the return would have been considerably increased. I may here remark that I have always put down a great part of the financial success of market gardeners as being due to their system of scarcely ever letting the ground at almost any season ever want a crop. By so doing loss of manure by drainage is minimised, and rent saved. Other things have no doubt contributed to the success of market gardening in all countries, but this has no doubt been one important factor among the many others. *North British Agriculturist.*

(*To be continued*).

Various enquiries having been made regarding collections of a Zoological character, illustrative of Indian sericulture, the Government of India have deemed it expedient, in the interests of the silk trade of India, to meet these enquiries, and have requested the authorities of the Indian Museum at Calcutta to undertake the management and direction of the collections, and to provide all instructions necessary as to their character. In order to make these collections as comprehensive and representative as possible, they have requested local Governments to nominate an officer to organise the collections in each Province, and who may be placed, in direct communication with Mr. Wood Mason, the Superintendent of the Calcutta Museum, The Madras Government have entrusted this task to the Superintendent of the Government Central Museum, and Collectors of Districts have been directed to make collections of all the silk-producing moths that are to be found in their districts, together with their eggs, caterpillars, and cocoons, and forward them to him, who will arrange, report upon, and finally despatch them to Calcutta, to be incorporated with the general collection for all India.

EUCALYPTAS OILS.

THE attention of all colonial pharmacists is at present being drawn to the field for work which is open to them in the production of eucalyptus oils of various kinds. In a series of papers to *The Chemist and Druggist of Australasia*, by Mr. William Sutherland, B. Sc., there is a very full account of the genus, and its products treated from the historical, botanical, and commercial points of view and from these we gather that an impetus is being felt in the oil distilling industry. There can be no doubt that in this industry colonial pharmacists have an excellent auxiliary trade. Until a few years back the trade was practically the monopoly, and perhaps deservedly so, of Mr. Bosisto the introducer of the oil, but now that the demand has expanded so greatly, the supply is occasionally short. This should not be the case, seeing that the source is so extensive. If the farming principle were in vogue in Australia, we believe that supplies would be ample, and that the industry would be greatly developed. It appears to be now certain that the oil of *Eucalyptus amygdalina* is the universally-accepted therapeutic agent, and that the recent scare as to the valueless nature of iodoform as an antiseptic will in no wise effect the use of the oil, although they generally go together. It is important that distillers should be careful to keep the oil of this species distinct from that of the *mallee eucalyptus*, which differs greatly from it. That oil is excluded from use in medicine on account of its specific gravity being higher than the pharmacopœia standard, but it is extensively used in the arts as a perfume for soaps, and in combination with other antiseptic agents for various purposes. It was at one time supposed that there was a great future for this oil as a resin solvent, in varnish-making, but hitherto, owing to the large demand for it for other purposes its price has excluded trial in this direction. Provided it can be produced at a non-prohibitive figure, the nature of the oil makes it specially suitable as a basis for varnish, which in drying would act as a contagion destroyer.

It is rather a remarkable fact that the oils mentioned are the only ones which have ever come into commerce in any quantity. This is attributable to absence of demand, and also to the small yield afforded by other species. Mr Bosisto's figures regarding the yield of oil have generally been taken as the standard, and we notice that Mr. Sutherland, in quoting them, draws attention to the wide differences between them and those given by Mr. W. Nitschke, of Hackney, South Australia. For example Mr. Bosisto gives 200 fl. oz as the yield of oil from 1,000 lbs. of the leaves of *mallee eucalyptus* while Mr. Nitschke gives 81 fl. oz The latter's figure for *E. odorata* is 112½ fl. oz per 1 000 lbs., Mr. Bosisto's 7 fl. oz This discrepancy must be due to something else than locality and season, which greatly affect the yield of oil from *E. odorata*, but whatever may be the cause, it is evident that there is work in the subject for pharmacists on the spot.—*Chemist and Druggist*

WHY IS BALDNESS?

"The theories that are held regarding baldness are varied and strange. Some hold that this is an indication of intellectual strength, others of high development, and still, of others, that it is but an evidence of weakness. If we were to express an opinion, we should say that baldness of the head is due, directly and indirectly, to one or more of many causes—first, the custom of wearing an impervious hat; then, enervating employment and unsanitary conditions (operating, perhaps, analogously to typhoid fever); intense, protracted cerebration, and heredity. Certainly many highly intellectual men are bald, but it by no means follows that all those who are bald are of superior intelligence Idiots usually have a great abundance of hair, but of course their brains are very small. Other things being equal, the man with the heavy head of hair will be a better animal than the one who is bald, and more likely to live longer.

"Baldness is accompanied by an exhausted nutritive power of the skin, and normally is the peculiarity of old age; it varies in degree 'from moderate thinness of the hair, such as occurs in *Depluvium capillorum*, to complete baldness—*alopecia calva*, or calvities, the latter not limited to the scalp alone, but involving eyebrows, eye lashes, beard, and every hair of the body' A strange thing is that baldness is apt to extend forward from the summit of the scalp in men, and backward from the summit in women. There is an affection where the person, often a child, becomes bald in spots. This is known as *alopecia areata*, and is generally treated with blisters.

"Man is more natural with, than without hair, and consequently everyone likes to re[tain] it. The last year has given us Lanoline, which is obtained from wool, and is the fat natural to the hair and horny layer of the skin. It is much used to prevent weakening (atrophy) of the skin, and to nourish the hair, in Germany, and is said to be of exceptional worth. It is absorbed by these tissues at once. There are now to be obtained in this country both a Lanoline Cold Creamand a Lanoline Pomade, of which we recommed a trial by those who have no hair on the top of their head, in the place where the wool ought to grow!"—*Medical Exchange*.

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VOL. XII.] CALCUTTA :—SATURDAY, MAY 21, 1887. [No. 21.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 12TH MAY, 1887.

Madras.—General prospects good.

Bombay—Rain in parts of twelve districts. Preparations for *kharif* sowing progressing in different parts of the Presidency. Fever in parts of six, cattle-disease in parts of twelve, small-pox in parts of five, and cholera in parts of four districts.

Bengal.—Weather hot and close, with general showers and storms, but the rainfall was scanty in Behar. Cultivation is going on well, but more rain is wanted in Bancoora, Jessore, Rajshahye, Pubna, Furreedpore, and the Chittagong Hill Tracts and Cuttack. Sugarcane, indigo and *cheena* promising Reaping of *boro* paddy nearly over, Public health indifferent, cholera prevalent in many districts, especially in Behar, Backergunge and Rungpore.

N.-W. P. and Oudh.—Week rainless. Weather seasonable. Harvesting operations completed and prospects promise well. Cane and indigo crops being irrigated. Supplies ample. Prices fluctuating. Public health fairly good. Cases of cholera and small-pox continue to be reported from some places.

Punjab.—No rain fell last week —Health fair in the Hissar and Dera Ismail Khan districts, otherwise good throughout the Province. Prices falling in the Sialkot and Shahpore districts ; rising in the Umballa, Lahore and Rawalpindi districts ; fluctuating in the Mooltan district, elsewhere stationary. *Rabi* harvesting almost completed, outturn below average. *Kharif* sowings commenced in the Amritsar district. Fodder scarce in the Shahpore district.

Central Provinces.—Weather hot, with high winds and occasional storms. *Kharif* ploughings commenced. Small-pox and cattle-disease in places. Prices steady.

Burmah.—Sporadic cholera in parts of Lower Burmah. Cattle-disease in two districts, otherwise, cattle healthy. Reports received from seven Upper Burmah districts. Slight measles, fever and small pox, Cattle healthy, Food-supply insufficient in Meiktila.

Assam.—Weather rainy and stormy. Planting of sugarcane in progress. The *sáil bura* crop in Hatiganj is said to have been an excellent one. Other crops doing well. Ploughing and sowing of *dumai* and *murari* crops continue. Planting of sugarcane progressing. Prospects of *ahu* and other crops good. Cholera in Lakhimpore, otherwise public health good. Cattle disease in Karimgunj. Prices steady.

Mysore and Coorg.—Rainfall fair in Kadoor and Hassan districts, and slight in other parts. Except in parts of the Tumkoor district, standing crops are reported to be in good condition. Prospects of season favourable. Water-supply diminishing in parts of the Kolar district. Small-pox and cattle-disease continue in affected parts. Prices slightly fallen in Bangalore, Kolar, Tumkoor, Mysore and Kadoor districts. Coffee and cardamom crops promise well.

Berar and Hyderabad—Weather sultry. Violent storms, with heavy rain. Field operations continue. Preparation of land for *kharif* progressing. Reaping of *rabi* crops continues Cholera still prevails at Hyderabad and in the talooks. Small pox and cattle-disease in Akola ; otherwise health of men and cattle good. Prices steady.

Central India States.—Thunderstorms accompanied by a little hail. Weather unsettled. Prospects fair. Small-pox still in Lashkar and four deaths in Goona city. Otherwise public health good. Prices fluctuating.

Rajpootana.—Except slight showers in Bickanir, the week was rainless. Tanks and wells diminishing generally. Harvesting of the *rabi* crop continues in places, while threshing has commenced in others. Sugar-cane and cotton being sown. Fever and small-pox prevalent in Kerowlee, Ulwar and Bickanir, otherwise health good. Cattle-disease in Merwara. Prospects generally fair. Prices generally steady.

Nepal.—Weather fine. Prospects fair.

Editorial Notes.

MR. WALLACE, Professor of Agriculture in the Edinburgh University, was expected at Bombay by the last mail. Mr. Wallace is coming to this country to make a study of the system of Indian agriculture.

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WE understand that the India Office has under publication a valuable report of a special examination made by experts into a collection of the most important Indian fibres exhibited at the late Colonial and Indian Exhibition in London.

A SCHEME for the botanical survey of India has, it is understood, been arranged by the Government, by which the country will be divided for the purposes of botanical investigations into four charges. The scheme has been prompted by the authorities at the Royal Gardens at Kew.

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AN attempt has been made, we note, to grow opium in Tonquin by the French, and some Hindoo cultivators and an English manager were engaged for the purpose and sent down from Calcutta. The poppy seems to have grown well, and the first samples of opium were sent at the end of March last to the Resident-General at Hanoi.

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THE newly issued official returns of Russia's foreign trade for 1886, show a decline of 30 millions sterling in the value of exports and imports since 1883. The decline on the exports is mainly in cerials. The value of wheat exports alone has fallen from 13 millions sterling in 1881, to little more than 9 millions sterling. We fear India is responsible for the enormous decline of the Russian wheat trade.

A CORRESPONDENT at Buxar states that the demand for wheat in England has sent up the price of wheat in India some Rs. 50 per hundred maunds, as compared with the rates in vogue several months ago. And that in consequence many firms, both in Calcutta and Bombay, have despatched buyers to Buxar and up-country to secure all the wheat that offers. Among these firms Messrs. Ralli Brothers is most conspicuous.

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A KULU correspondent, writing on the 6th instant, says :—"No rain during the past week ; the heavy clouds which threatened a downpour, having passed off in a slight drizzle. Tea-picking began on 25th April, the flush is very good indeed, and had there only been more rain, it would have been a superlative one. Fruit prospects are decidedly poor. It is getting unpleasantly warm, but luckily, cool breezes continue almost without intermission. Though the deficient rainfall, (the rain that usually falls at this season having also failed to come), has injured the crops in the lower valley, yet above Sultanpore they are good, the wheat being very heavy. Wheat, 24 seers ; barley, 30 ; Indian corn, 32 seers per rupee. Heavy clouds again gathering this afternoon to the N. and N.-E.

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WE publish in another column some interesting facts relating to the foreign trade of Germany, from which it will be seen what rapid strides that country has made in some respects, and how it has fallen off in others. One point in particular is worthy

of note, *viz.*, the trade in wheat. In January and February 1883, Germany imported 1,576,263 double centners of wheat (equal to about 1,57,626 tons) in excess of her exports; in 1885 this quantity had increased to 3,602,141 double centners (360,214 tons), but fell off in the same months of the current year to 683,856 double centners, or about 68,385 tons. The chief source of Germany's wheat supply is not stated in the statement from which we are quoting, but it would be interesting to know something about it.

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IN the published proceedings of the local Agri-Horticultural Society for April 1887, we read that Mr. C. C. Stevens, of Ranchee, has forwarded a small packet of the seeds of cucumber grown in the Jashpore State, regarding which Mr. Stevens writes :—"The fruit is not long but very thick, say 5 or 6 inches in diameter. It is grown on the hills, and probably requires good drainage. In Jashpore it is sown in June. The raja tells me that cow dung should not be used, but that grass should be burned in the place where the seeds are to be sown. The specimens of the vegetable I have seen have not been good for use as salad, but have been excellent when cooked." As it is possible that with careful cultivation, this cucumber may be much improved, some of the seeds have been sent to Kew with the information afforded by Mr. Stevens.

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WRITING on the subject of coffee cultivation in the Philippines, a Manilla paper says: "Coffee is recovering; the returns showing an export of 117,392 piculs, against 83,337 in 1885. Yet its cultivation does not seem to spread, though the local environment admits of a higher outturn. The efforts made to mend matters have failed from lack of push and go. A few years back, the Government directed the provincial authorities to order the natives to plant coffee far and wide. The authorities turned to with a will. Coffee plants were set out in thousands. Glowing anticipations were built on the prospects of their yielding plentifully. Other matters engrossed the attention of Government. Interest in the work so well begun, flagged. The newly-laid-out coffee plantations soon went to wreck and ruin. Nothing has been done to repair the neglect. Further comment is superfluous."

WE quoted a few weeks back a paragraph from our Lahore contemporary, regarding the leaves of the Osage orange plant having been used with marked success in America for feeding the silk-worm upon, and that the Government of India had been led to make enquiries as to whether the leaves could be used as successfully in India. We are now told that Mr. Duthie, the Superintendent of the Botanical Gardens at Saharanpore, has reported that he has procured seeds of the Osage orange from Philadelphia in 1884, and that there are now 1,600 young plants in the Saharanpore Gardens. He is doubtful, however, whether the leaves of the plant could be used with any advantage for feeding silk-worms in any part of the country where mulberry trees thrive; but he thinks it might possibly be worth while making the experiment in parts of Bengal, where the particular variety of mulberry in use is inferior in quality, compared with the kinds which are grown up-country.

WE learn from a contemporary that the annual Kangra, Gurdaspur Cocoon Exhibition was held at Pathankot on the 5th instant. There were about 180 exhibitors. The minimum exhibit allowed was 5 seers of cocoons. The species on show were Italian, French, Japanese, and East Indian. There were about Rs. 1,500 given away in prizes. Lester and Co., as usual, took the first prize. The petty native rearers of Gurdaspur and Nurpur-Kangra were almost all rewarded ; the object being to set the industry on a better footing, and encourage wholesale rearing. Excepting Lester and Co., the whole stock in trade of the exhibitors was reckoned at about 6,000 Rs., or 70 or 80 maunds of Cocoons. The Kangra district contributed Rs. 500 to the prizes ; but the Kangra exhibitors took very little of the amount away again. There were specimen cocoons from Sialkot and the Government concern at Changha Manga ; those from the latter place being classed very low down.

WE note that the tobacco Trade Section of the London Chamber of Commerce has announced an offer of two prizes of 50 guineas each, to be awarded, respectively, for the best specimen of tobacco grown in the United Kingdom, and for that produced in India or in any of the British colonies and possessions. These prizes are given as a means of definitely ascertaining how far the above sources of production can add to the supply of tobacco suitable for the English market, and to what extent, if any, these growths can compete in quality and price with those of foreign countries, from which the consumption of the world has hitherto been chiefly drawn. Each specimen submitted for the competition must consist of a minimum quantity of tobacco, grown on a commercial scale, and therefore not less than 400 lbs. in weight. A jury of experts, assisted by recognized scientific authorities, will make the awards. Here is a chance for some of our enterprising Indian tobacco growers.

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A PACKET of seeds of the Abyssinian cereal "Teff" (*Fragrostis Abyssinica*) has been sent to the Agri-Horticultural Society of India by the Director of the Royal Gardens, Kew. It is described in the Kew 'Bulletin' far January, as an "Abyssinian cereal of economic value, suitable for cultivation at high elevations." There appear from the information contained in the Bulletin' to be four kinds of *Teff* cultivated in various Abyssinian provinces, at a height which varies between six and seven thousand feet above sea level, where the seed is sown in August and reaped about four months after, at the beginning of December. The flour is very white and produces bread of excellent quality which is commonly used throughout Abyssinia. It is interesting to note that this grain appears "practically unknown outside the confines of Upper Egypt and Abyssinia. Mr. Thiselton Dyer thinks it might advantageously be introduced into certain hill stations in India, as well as to elevated portions of our Colonial Empire. The seed sent to the Society is to be distributed to members in suitable localities for cultivation and report. Some has been sent to Mr. C. C. Steven, Commissioner of Chota Nagpore, who has undertaken to have careful trial made in elevated Native States in his Commissionership. Some is to be sent to Darjeeling Mussoorie, Naini Tal and Fort Munro, for trial.

As an instance of carrying red-tapeism to the extent of ridiculousness by the Government, the *Times of India* writes :—

We read in the columns of the *Pioneer* that the Government have so far decided in favour of the fodder compressed by the process patented by Mr. Arthur Rogers, C E, that they propose to press a thousand bales, place them on the backs of 100 mules and 100 camels, and then march the animals about the country for six months. This is presumably considered to be a practical way of testing whether the fodder will not deteriorate with long keeping, and under variations of season and climate. If the facts are as stated by our contemporary, then the Government have indeed reached the extreme limit of the ridiculous. It would surely be no difficult matter to reproduce artificially the different kinds of climate—dry heat, moist heat, cold, wet, &c.—and test the compressed bales in the space of a fortnight. But the experiment is actually to drag on till October, when the fodder is to be opened, and if found sweet and good, " some terms may then be offered to Mr. Rogers" ! And such a decision is actually come to at the very moment when the darkest of war clouds is gathering on our north west frontier. Is the terrible *fiasco* to be re-enacted, of beasts of burden perishing by their thousands through having to eat unsound fodder—and that only got up to the front with the greatest difficulty and at inordinate cost—while the peripatetic 100 mules and 100 camels of the Government are moving slowly about Northern India and the plains with their thousand bales of fodder, now being soaked by rain and now being stunned, all by way of experiment, of course ! Under any circumstances we should expect something like military promptitude in deciding as to the feasibility of a scheme which is claimed to possess, and does seemingly possess, advantages whose importance cannot be over-estimated. In the face of the dangers now looming on the horizon, the preposterous delay is simply impossible of excuse.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week

ending 12th May, 1887 :—Except in the North-Western Provinces and Oudh, the Punjab, Central Provinces, and Central India, and Rajpootana, there has been a fair amount of rain throughout the country during the week under report. The falls were heaviest in Bengal, Assam, and Lower Burmah. The *rabi* harvest now only proceeds in Hyderabad and the Punjab. *Kharif* operations are extending to most parts of the country, and are now in progress in Bombay, the Central Provinces, the Punjab, and Berar. The outlook is generally satisfactory in Madras, Mysore and Coorg. The spring rice has been nearly reaped in Bengal, and the early rice is doing well there and in Assam. Sugarcane has yielded an average outturn in Madras, it is being planted in Assam and Rajpootana, and the crop promises well in Bengal, the North-Western Provinces and Oudh, and the Central Provinces. The condition of indigo in Bengal, and the North-Western Provinces and Oudh is favourable. Cotton-picking is approaching completion in Bombay. The public health is generally good everywhere, except in Bengal, where it is but indifferent, owing to the prevalence of cholera in many places. Prices are fluctuating in the North-Western Provinces and Oudh, and rising in three, and falling in two districts of the Punjab. A slight rise has also occurred in three districts in Mysore. Elsewhere prices are fairly steady.

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Colonel W. B Thompson, of Kashmere, had been asked by the Agri-Horticultural Society of India for some information regarding Kashmere silk ; but the Colonel having left the country before the silk season, suggested a reference to Mahomed Jan, a shawl merchant of Srinugger, who was addressed on the subject. In his reply, Mahomed Jan, in reference to the cocoons of mulberry silk that used to be sent to Calcutta in former years, makes the following observations, which would suggest that some forms of the disease amongst silk-worms, which Mr. Wood-Mason has found to be so wide-spread in Bengal, have also been developed in Kashmere :—" 1st The Mulberry Silk Cocoon.—At the time silk used to reach Calcutta from Kashmere, the seasons were good, which continued for some time, but on account of sickness breaking out, the trade fell away The sickness amongst the worms was, that as soon as they were ready to spin their cocoons they used to die. This has gone on for the last five years, and during this period, silk from Yarcand, and that stored before were used, but in the last season sickness not being so great, the cultivators began cultivating silk again. The season commences from the 12th April, corresponding to the 5th Bysack. 93, and 17th Rujjahs, 1304 ; the time of incubation is fifty-five days. I could send you live cocoons, but it is likely they would not reach alive after the heat in the post bag."

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The following is a summary of Messrs. William, James, and Henry Thompson's Fortnightly Circular of Indian Tea, dated 21st April, 1887:—Subsequent to the issue of our Circular of 31st March, 11,700 packages of Indian and 3,200 packages of Ceylon Tea, were offered before Easter, and met with brisk competition but except upon some of the most attractive qualities of Pekoe and Broken Pekoe there was not any quotable advance. After the usual interval a small Auction was held on the 14th instant, at which stiff prices were paid. Sales recommenced on Monday, the 18th, and some 17,250 packages of Indian and 3,150 of Ceylon have this week been brought to the hammer. A fair general business having been done during the holidays, and the Dealers having begun to see how the continued large Deliveries have improved the position, demand has been strong, and for all but the commonest kinds, under 6d per lb., prices have experienced a decided upward movement, amounting to 1½d to 1d. on teas between 6d ad 1s. : about 1d. to 2d. on grades between 1s. and 2s; and from 2d to 3d. on choice teas over 2s.; the advance, however, is not obtainable on tea of inferior and undesirable character, which remains slow of sale, at about previous quotations The March Deliveries were 7,151,000lb. of Indian, and 610,000 lbs., of Ceylon, as compared with 5,808,000 lbs, and 317,000lb., respectively, last year. Should this rate be maintained for Indian, there will be little more than 10 millions of this crop—say 6 weeks' consumption—left in the Bonded Warehouses in August. We estimate that about 111,000 packages of the crop remain to be sold : subsequent to this date last season 115,000 packages were sold.

We are told by a Madras contemporary that the late Governor of Madras, both by his extensive attainments in the science of botany and the weight of his official position, added considerably to our knowledge of South Indian plants and products. During his tenure of office, Sir M. E. Grant Duff kept up an incessant correspondence with the authorities of the London Kew Gardens, and his letters from here used to be regarded as welcome additions to the literature of South Indian Botany. Mail after mail, innumerable packets of seeds, culled in and about Madras, and from various parts of the Presidency, during his morning rambles and numerous official tours, used to find their way to Kew, and a plant of the *Calotropis gigantea*, raised from seed forwarded by him, and in full flower, is figured in Vol. 42 of Curtis's Botanical Magazine. In one of his last letters from Madras to the Director of Kew Gardens, recorded in the latest number of *Nature*, he brought to light a very interesting property possessed by a weed common in and about Madras—*Gymnema sylvestris*—a climbing asclepiad, the chewing of the leaves of which destroyed for the time being the power of tasting sugar, the Governor having tried the experiment personally, in the company of three friends, and found that powdered sugar taken after masticating the leaves tasted like so much sand. The results of a chemical examination of the leaves by Mr. Hooper, the Government Quinologist, are also recorded in the aforesaid number of *Nature*. Mr. Hooper has discovered a further property that the leaves possess, *viz.*, that of destroying the quality of bitterness quinine taken after chewing them tasting like meal, and he thinks that, if further experiments tend to establish this property, the powdered leaves may prove a convenient vehicle for the adminstration of intense bitter drugs, such as quinine, &c.

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We may add that the genus *Gymnema* is remarkable in some other respects. For instance, the milky juice of the *Gymnema lactiferum* is used by the Singalese for food, who also use the leaves when boiled ; while indigo (on the authority of Sir Joseph Paxton) of excellent quality, is obtained from *Gymnema tingens* The genus is a native of Ceylon and Southern India generally.

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According to Consul Jenningham, tea cultivation in Japan would appear to be making rapid strides The value of the exports has nearly trebled during the last 17 years, while the quantity exported has oustripped the value. This is owing in a great measure to the fall in prices of all ordinary Japanese tea. The local home consumption has also greatly increased, for we are told that 'tea-houses' are as numerous in Japan as public-houses in England. It is supposed that tea cultivation in Japan is of modern growth ; but this appears to be a mistake, according to Mr. Consul Jenningham, who tells us that tea-seed was originally brought from China to Japan in the ninth century. At first it seems to have been regarded as a rare delicacy fit for only royalty and the highest nobility. Special precautions were taken in the growth and manufacture of the tea destined for the use of the Mikado. No unclean persons who had tasted fish were allowed to pick the leaves lest their breath should contaminate them. The pickers were required to wash themselves two or three times a day, and they were not allowed to touch the leaves except with gloved hands. These old-fashioned precautions seem now to have fallen into disuse. The leaf picking is now carried on chiefly by women, and men go round with large baskets collecting the leaves picked by the women, and carrying them off to the factories to be steamed and fired. Generally the tea gardens belong to small proprietors, who sell the leaves when fired to large dealers, and the latter pass them on to the merchants at the Treaty Ports, where they are packed for export. The Japanese tea-planter is said to enjoy an immunity from the ravages of the red spider, the tea-bug, the green fly, and the orange beetle. But his plants suffer from an insect called the *minomushi*, in Japanese, which seems to be like the paddle-cricket. On the whole, with cheap labour and convenience of land and water carriage, the Japanese tea-merchant comes

into the market favourably handicapped against his competitors of other nations and countries.

The labours of the Bombay Forest Commission having come to an end, the result is now given to the public in the shape of four bulky blue-books. From a summary of the report telegraphed by the Bombay correspondent of one of our contemporaries we gather that the commission holds that the former customs and conditions of agriculture in North Konkan, give cultivators strong and special claims to liberal treatment respecting all arrangements for the supply and distribution of forest produce, as supplies available from sources other than existing forests are insufficient to meet their wants. It is explained that the stricter regulations introduced as consequences of the recent forest policy have greatly curtailed the former privileges of the people. The Commission recognises the fact that the local conditions may, in the more thickly populated parts of the Konkan Taluka, make it expedient to place under forest management and conservancy much of the area formerly assigned for communal pasture and supply of local forest wants ; but that such separation cannot be effected in other localities without sacrificing all the effective guarantees for the permanence of supply. While advocating a liberal settlement of cultivators' claims, the Commission shows the necessity of so regulating the use of forests as to provide a reasonable and effective safeguard against the exhaustion of supply. Keeping this point in view, most liberal arrangements are recommended for meeting the grazing requirements of the cultivators, and the local demand for forest produce for *bonâ fide* home and field use. It is also proposed that, as a temporary concession, cultivators should be allowed for the next ten years the use of certain specified trees in portions of reserved forests. As for trees on occupied land, the cultivator is to enjoy the use of them for agricultural and domestic purposes, stringent precaution being taken against their sale. Emphasising the latter condition, the Commission says that there is little hope of occupants guarding and preserving trees on their lands, until the full use and enjoyment of them for agricultural puposes has been guaranteed to them.

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The tobacco industry of the Philippines does not appear to be in as flourishing a condition as it used to be before the abolition of the Government tobacco monoply. A Spanish paper *(Comercio)* furnishes some interesting particulars on the subject. Thus, we are told that the abolition of the Government tobacco monopoly in the Philippines has taken effect unfavourably, not only on cigars, but also on leaf tobacco exported. Four years have passed away since that measure came into force. However beneficial the reform may prove to be in after years, tobacco as raw material, or as cigars, still falls short of the mark reached in monopoly times, both in yield and quality. Growers have never realised the fact that free trade in tobacco did not mean liberty for them to cultivate that article badly and cure it worse, but afforded them an opportunity for turning out a product superior enough to bring higer prices than the Treasury paid them in the days of the monopoly. In those times, the Government had an interest in the outturn proving of marketable quality. Now-a-days, with no influence for good to keep them on the right path, the cultivators, naturally heedless and neglectful, grow a crop anyhow, without a thought of the care and finish required to render the article acceptable. Their only object is to bring it to market as soon as possible, no matter how inferior the quality. Sometimes the crop is sold before it is cut, neglect in this case being grosser. The crop under such circumstances fails to bring the prices expected when it reaches Manila. Cultivators become discouraged. In place of trying to mend matters, they grow reckless. A few growers and dealers are more conscientious, but their efforts are of no avail to keep up the reputation of Philippine tobacco. The soil and climate of the islands are as suitable as ever for the cultivation of the leaf. The only way to improve matters is to bring home to growers the need of improving the quality of their produce, by cutting the crop in due season and curing it in a business-like manner. In no other way can the abolition of the tobacco monopoly be expected to result satisfactorily. In 1886 the leaf tobacco exported, reached 120,793 quintals, against 136,144 in 1885. Under present circumstances, with greed and indifference in the ascendant among the planting community, the experiment of free labour in tobacco growing in the Phillippines, set about with such a great flourish of trumpets, amid highly strained expectations, bids fair to become a failure.

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We are told that the Washington Department of Agriculture has printed 310,000 copies of its last report. In explanation of such a vast number of copies being printed, a correspondent, writing to a local contemporary, furnishes some interesting particulars on the subject of printing annual reports generally in the great Republic. It appears that the great Trans-Atlantic Republic is an institution of the people and is not permitted to have any belongings which do not belong to the people. "When the Government issues a report or a monograph, a sufficient number of copies are printed to give each Member of Congress an unlimited supply for his friends and constituents. In sparsely settled states these friends and constituents are mostly farmers who have successfully eluded the ubiquitous book-agent, and whose libraries do not extend far beyond a pictorial family Bible. To these gentlemen the advent of an imposing book packet from Washington, with the official seal on the outside, and "compliments of Senator A—" in the inside, marks an epoch, and the recipient is a great man at the grocery store where he saunters down to smoke and dicuss politics and crop prospects. The company is larger than usual that evening and a general vote is passed that the county did a big thing when it voted solid for Senator A. The news gets abroad that similar packets have been delivered to the parson, the school master, and the editor of the *Tappanhassee Weekly Chronicle*, the next issue of which contains a polite notice of the occurrence, with the names of the farmer the parson and the schoolmaster, and a neat eulogy of Senator A—whose services in promoting the interests and upholding the glory of the United States more than justify the electioneering sagacity of the citizens of Tappanhassee Meanwhile the volumes lie on the farmer's parlour shelf till the gloss goes off their black cloth boards, and the children cease to regard them with awe. A Season passes, and one is used to press ferns and wild flowers, and another has the alternate leaves cut out, and is converted into a scrap album."

THE BENGAL AGRICULTURAL DEPARTMENT, AND CIRENCESTER GRADUATES.

The *Englishman*, as usual, has set itself the task of vilifying the Agricultural Department of Bengal, and in its attempts at facetiousness, has managed to make itself very ridiculous. In a recent issue our contemporary tells us, that when the department was established, "we were to have model farms scattered over the province, agricultural shows were to be held, at which the ryot was to gaze open-mouthed at the latest improvements, and learn (if he could be taught) how to get more out of his already over-cropped land." This is the kind of stuff the entire article on the subject is made up of When our publicists descend to a perversion of truth, and a travesty of facts and things of which they know absolutely nothing, it is time that we ceased to have any faith in their endeavours to guide and enlighten public opinion. As a matter of fact model farms *have* been established, and agricultural shows *have* been held, from which the ryot *has* learned many things, of which he knew nothing before. As to the "already over cropped land," this can only exist in the writer's imagination ; for any one who has travelled about the country cannot fail to have noticed large tracts of land utterly destitute of cultivation. It might as well be said that the land in England or in the United States is 'over-cropped.' One of the first principles of agriculture is to return to the land, in the shape of artificial manures, that which has been taken from it by the crops grown thereon. If this is done, how can the land be 'over-cropped ?' It is to teach the Indian cultivator something of this first principle (of which our contemporary is hopelessly ignorant) that the various agricultural departments have been established. It was found that the land was becoming impoverished by the usual methods adopted by the ryot for cultivat-

ing it, and unless something was done to remedy matters, it would go from bad to worse. To talk of 'over-cropping,' is rank nonsense, and evidences a degree of ignorance scarcely to be expected from a journal of the *Englishman's* standing. There is no such thing as 'over-cropping'; the word is a misnomer, and has no meaning. It is astonishing to find so much ignorance prevalent regarding the functions of an agricultural department—and especially the Bengal Agricultural Department. In the first place, the latter has barely been in existence two years. This fact alone ought to convince outsiders that wonders cannot be expected in that time. In our opinion, the department has a very satisfactory record to show for the period it has been in existence, and we have no hesitation in saying that it has justified its maintenance on a permanent basis.

When it is remembered that the millions of India are solely dependent upon agricultural produce for their living, we marvel that any one should be found who, for a moment, should raise his voice against the introduction of any agency that will teach these millions how to "grow two blades of grass, where only one grew before." The material prosperity of this vast empire depends upon its agricultural industry. The population is almost entirely agricultural. Out of a total male population of 130 million souls, 56½ millions, or a litite over 43 per cent. are returned in the last census as being directly engaged in agriculture; while 12½ per cent are returned as being engaged in commercial and industrial pursuits—all more or less having an intimate cannection with agriculture. In the face of these facts, the *Englishman* (which, by the way, is the only journal in India that has shown such a prejudice against the Agricultural Department of Bengal) can calmly write that an agricultural department is practically useless for a country like Bengal, teeming with an agricultural population, We have no patience with writing of this kind.

So far as the Government agricultural scholarships are concerned, there can be but one opinion, *viz.*, that unless the people of the soil can be persuaded to take to scientfic agriculture, there is very little hope of effecting any permanent good by the help of European agencyexclusively. A wiser step could not have been taken than that of giving the sons of the soil an opportunity of acquiring a thorough knowledge of scientific agriculture, by a training in England. It is more likely that the people will be guided by their own countrymen than by foreigners in matters relating to the cultivation of the soil. The Indian cultivator is admittedly conservative in his ideas on this subject, Certain methods have been handed down to him from remote times, and these be regards as the most perfect. His ancestors 'knew best:' that is what he will tell you if you ask him why he does so-and-so, when by doing so-and-so, he might obtain much better results. If it can be demonstrated to him that, by using one maund of nitrate of potash, the cost of which is three rupees, he will increase the outturn of wheat on one acre of land from 13 to 27 maunds, and then make a net profit of 28 rupees on the crop, surely he will not be so blind to his own interests as not to take the hint,when he sees the result of such a method of cultivation. And who can explain these matters better to the untutored ryot than his own countrymen? Where we have to find fault with the Government is, that having held out hopes of employment to these Cirencester graduates, they should now be disappointed,and allowed to knock about the country without any ostensible means of livelihood. Another mistake has been that, instead of selecting the sons of zemindars and cultivators, who would, on return from England, apply the result of their knowledge to their own estates, youths have been selected simply on the result of the University Examinations, without any regard to the fact whether these students possessed any land or not. The consequence is that these men now find no employment for their talents, and very naturally look upon the time thus spent in acquiring a knowledge of scientific agriculture as wasted, and which could have been better employed in the study of something else. However, these scholarships have now been temporarily suspended, but we hope that, should it be considered desirable to renew them, it will be borne in mind to select the sons of zemindars and well-to-do ryots, as a rule. We are satisfied that by doing so, much better results will b obtained.

GARDENING IN CALCUTTA.
XIV.

FERNS—(*Continued*).

HOW TO RAISE FERNS FROM SPORES.—The first consideration must be to prepare a suitable compost, and for most varieties I find the following. answer well:—one-fourth silver sand, one-fourth leaf mould, one-fourth finely chopped moss, and one-fourth light fibrous loam, wrought in a dry condition and sifted as fine as possible. But first a box 18 or 20 inches square by six inches deep behind, sloping to 3 inches before, is necessary, drilling a few holes separately through the bottom Next cover the bottom, one inch deep, with broken crocks, and over this put a layer of moss sufficient to leave the surface regular and smooth. Lay on the surface the soil an inch deep above this lower stratum, which press firmly together with a piece of board; but before scattering the spores, a good method is to divide the bed with the edge of the board into as many divisions (draught-board wise) as there are varieties to sow. This accomplished, moisten the bed with a very fine rose, and allow the water to subside, after which sprinkle carefully the spores on the soil into the respective places allotted them, but avoiding mixing them. Following this arrangement one is able to judge which sorts are the most successful, with the additional advantage of being able to choose a desirable number of each for transplantation. The case should then be placed in a shady position where it is not subject to any great changes of temperature. Keep a watchful eye that the surface of the bed does not get dry, and daily remove the condensed vapour that will arise from the soil and gather on the glass. Admit air sparingly, only for an hour once or twice a week, until the plants appear, so that a little fresh air is administered to the soil, but this should not interfere with the constant maintenance of a moist atmosphere so essential to work the process of germination. See that at this stage the soil does not get dry, at the same time guard against the bed getting saturated, as this would be sure to propagate a scrutomy formation which would soon over-spread the bed besides encouraging the growth of moss. Moderation is the best preservative in either case. As to the time spores take to germinate, and the duration of the vital spark in them, it is difficult to determine; some make their appearance in a few weeks, others in a few months; while others again allow a good many months to elapse before indicating any signs of life. The infant fern in its earliest stages of development is a curiosity indeed: nothing is more unlike a plant than the infinitely minute speck of a green ball that requires the help of a pocket lens to define and looks like a watery substance instead of a fern in the course of formation. The next stage, one might say, is descernible to the naked eye being indicated by a slight green cast on the surface of the soil generally, but the glass has still to be brought into requisition, and under that power, in place of appearing globulate, they have assumed a saucer form, which goes on swelling its proportions for some time before leaves are started, and when leaves (fronds) do first appear, they are of the most humble character, being only a simple linear process, expanding towards the points where it is cleft. Presuming that the ferns have arrived at that stage when the fronds are discernible, and granting that all progresses favorably, the interior of the case will appear a dense carpet of various shades of green, bristled over with those puny representatives of fronds already described. Let them have every encouragement to make fresh leaves by maintaining a moist and warm atmosphere admitting air now daily and constantly in proportion to sun heat, closing early in the afternoon after moistening with tepid water. Thus husbanded little else is necessary until they have attained to that degree of strength qualifying them for transplantation.

Method of Separation.—This is nicely accomplished by means of a pointed stick, inserting it beneath the plants and raising a cluster of them at a time; and while carefully separating the individual plants with the fingers, take notice that as much soil adheres to the roots as possible. Plant the seedlings very tenderly, and allow the soil to be comparatively slack in the pot, which will enable the roots to make easy way for themselves. The seedlings must be kept close and shaded until it is ascertained that root action has again commenced by the sprightly look of the fronds and signs of new growth. When this is the case, the shading may be lessened by degrees, and air admitted sparingly, until they are accustomed to the exposure; continue thus to supply air daily and water

moderately, never permitting the soil to become crusted or dry, keeping a moist warm atmosphere about them. As soon as the fourth or fifth frond has developed, the plants will require a further shift, and this time into separate pots, say 3 or 4 inches in diameter. They may then be said to have got beyond the infant stage, and should be treated as established plants.

Soil for general culture.—The following compost will be found to answer well for almost every description of fern. Two parts fibrous loam, one part silver sand, one part cocoa fibre refuse, one part leaf mould, and, where available, one part chopped moss. The whole should be passed through a half-inch riddle or sieve, reserving the rougher portions to cover the crocks in the pots with. In addition to the foregoing ingredients, when the plants have attained to fairly large dimensions, they will not object to one eighth of the whole being very old cow manure that has been thoroughly pulverised.

Potting and general management.—All now being in order, crock their complement of pots, and provide each pot with a slight covering of the compost reserved for the purpose. Divide the balls carefully when separating the plants, taking care not to injure the roots; and while in the act of shifting, the soil ought not to be pressed too tightly to the roots, but simply shaken down with a few strokes on the potting bench. Potting completed, return the plants to their old quarters, their attendance there being comprehended in a routine similar to that recommended in their last stage of growth until they have reached a state which makes it desirable to provide them again with pots of larger dimensions. In the next shift it is most essential that the balls are kept entire, and that the plants are well stored with roots, seeing that the strongest plants may, after becoming established, be planted into vases, hanging baskets, or for whatever use it is desirable to put them to. Their subsequent requirements may be summed up in a constant attendance as regards watering at the roots, displacing dead leaves, turning to the sun, and maintaining a humid atmosphere, affording larger shifts as soon as the roots have netted the interior of the pots.

Diseases and Insects.—Ferns as a whole, are a healthy race of plants, and are seldom affected with the maladies or distempers so prevalent among many other genera of plants; but withal, some of the most tender species are subject to diseases of various forms. Mildew sometimes attacks them when the soil is allowed to get saturated and sodden, or when exposed to an ungenial atmosphere. The cause of the disease in this instance may suggest its own cure, by avoiding such treatment, and a small quantity of sulphur dusted over the affected part has a healing tendency. But should that disease be allowed to spread over the affected part, it is difficult to find a remedy. Green-fly at times find a footing even to entire possession on occasions, and to annihilate them requires some care. *Adiantums* as a class are particularly subject to the pest, and their tender leaflets are not at all adapted to withstand ordinary smoking (generally the best remedy); indeed, under its influence the leaves get speckled and blotched over with brown, and the fronds damaged to the extent of the withering of their leafy parts, this is specially the case with fronds that are young and tender. Other species, and among them *Pteris* and *Ap eniums* are much troubled with scale, a loathsome pest that makes its appearance along the main ribs (*rachis*), and if not subdued it is sure to spread itself along all the lesser veins. With the earliest indications of scale, the sponge should be brought into requisition along with a flattened smoothly pointed stick. The latter ought to be drawn carefully down each side of the veins, displacing the scale in the operation, after which a gentle application of the sponge over these and other parts of the frond, using water slightly impregnated with soft soap, and a syringe with pure water will complete the business. Next come "Thrips," small, thin, black insects, about one-sixteenth of an inch long (white when young) which are very destructive; they soon destroy the plants on which they live, attacking those that are in poor health, quickly making them worse. The best remedy is to examine the plants so infested, picking the insects off one by one, then sponge the plants with clear water.

Besides the above, there are several other pests which prove very troublesome to the cultivators of ferns, the well-known cockroach being a great enemy, with which also may be classed beetles, crickets, and wood-lice. As these usually come out of their retreats at night, at which time they feed on the young fronds, diligent search must be made for them by candle-light, at the same time keeping a look out for slugs and snails, which are equally, if not more, destructive than the preceding. It is almost useless attempting to find these in the day time, but an hour or two after dark, they are generally easy to find.

"RUS IN URBE."

Miscellaneous Items.

A PLANTER informs a Nilgiri paper that the condition of the coffee in the Coonoor Ravine is simply splendid. The trees appear to be in good heart, and a fine blossom has set. With coffee at 95, this means something. If it isn't the great bumper, it is very near it. The same favourable prospects attend the tea, which has thrown out a fine flush.

THE quantity of tea exported from China and Japan to Great Britain, from the commencement of the season to the 12th of April, was 149,482,280lbs., as compared with 147,258,663lbs. exported during the corresponding period of last year. The exports to the United States and Canada during the same period were 89,811,880lbs., as against 81,485,626lbs.

THE Mannar correspondent of the *Ceylon Observer* says that the Pearl-fishery continues, and is likely to extend some ten days more, and to result in Rs. 500,000 as the Government share. On the 21st and the following day, owing to the S.-W. wind setting in rather strongly, fishing had to be discontinued, and again from the 25th (Monday) the S.-W. wind prevented the boats going out. This wind was expected to continue about four days longer, and then ten days good-fishing. Up to the date of our last telegram (28th) the gross total of oysters was 30,676,180.

SOME laws are apparently wanted to stop the destruction of game out of season in the Punjab. A correspondent writes to our Lahore contemporary: "Can nothing be done to stop the destruction, during the close season, of the few hares and partridges that still remain in this province? Partridges which must now be having young broods to look after, are being offered for sale in Lahoul at the present time. In some municipalities there is a bye-law by which a fine can be imposed for every hare or game bird brought in for sale during the close season. But the real culpirts are the persons who allow game to be put on their tables when they know perfectly well, that it is out of

THE Government of India has been interesting itself in the iron oxides of various colours which exist all over India in sufficient quantities to warrant their use for painting and decorating purposes. At present hardly any of these are used except the red and yellow oxides with which we are all familiar, but there can be no doubt that many of the others are equally adapted for use. But little appears to have been either written or published about them, and therefore the local Governments have been requested to institute enquiries, and collect information, regarding the various kinds of pigments procurable in native bazaars suitable for converting into paints, together with the prices usually paid for them.

AT a meeting of the Anthropological Society of Bombay recently, Dr. W. Dymock read a paper on the "Anthropogonic trees of the Hindoo castes. He began by mentioning that it was a general custom among the Hindoos to bring into the house, the branch of a tree, as an object of worship in the marriage ceremony. The same tree is not used by all castes, the Udunbara (*ficus glomrata*) being used among the Brahmans, Asupala or Ashoka (*Saraca Indica*), among the Vaishas, Dhatakt or Agnijavala (*Woodfordia Floribunda*) among the Shenvis, and so on. The author also pointed out that some of the ancient customs in European countries were very like the Indian, and briefly summed up, that in every Aryan country at least owing to the analogy between trees and men, popular superstition supposes the first men to have sprung from trees.

ANOTHER source of wealth has been discovered in Australasia, in the growth and cultivation of oysters. It seems that the shores of Tasmania are particularly suited to the oyster which is already abundant there, but which has never been cultivated. Mr. Saville Kent, the Inspector General of Fisheries in Tasmania, has latterly been urging upon the people the advantages of oyster culture. In his last report on the subject he points out that if suitable spots are selected for the beds, where there is moving water containing food, a crop of oysters may be grown and gathered almost to a certainty. He shews how this can easily be done if care is taken of the spat, which he provides for by cheap wooden frames in which the spat can be kept, and thus protected from their enemies, while the frames can be easily raised and rocked so as to get rid of any sediments which might injure the young oysters. Perhaps before many years have elapsed tinned oysters may be added to the other importations from Australia.

The use of wood shavings, prepared by special machinery, for the packing of fragile goods, has recently been introduced into Germany from America where this material was first produced on a large scale. Since its introduction the application of this material has been considerably extended in Germany and shavings are now made as a regular commercial article in eight different sizes, the largest being composed of fibres about a third of a millimetre wide, whilst the finest scarcely exceeds the thickness of an ordinary wool fibre. Coarser qualities are used instead of straw or paper cuttings as a packing material, whilst the finer qualities are used as stuffing for the cheaper class of furniture, and the finest for hygienic purposes instead of lint. Intermediate sorts can be used for the cleaning of machinery, in substitution of cotton waste, and also for filtering purposes. Experiments made in several breweries with wood shavings, as a filtering medium for beer, have given very satisfactory results.

The *Hidoo Patriot*, in an article upon the last Report of the Agricultural Department of the N.-W. Provinces, says:—"We have over and over again shown in these columns, that many of the experiments conducted in the model farms relate to matters which can have no real bearing, direct or indirect, on agricultural improvements, and can certainly convey no lessen to the agricultural community. It cannot be too carefully borne in mind that the ordinary ryot cannot be expected to practise the transcendental agricuture of our model farms. We used to hear much of the famous plough invented by the North-West Department, in the time of Mr. Buck; but we are now told that 'the initial obstacle to improved ploughs in many places is that the starveling bullocks are unequal to the slightly increased draught.' Did not Mr. Buck assure us that the improved plough patronised by him was admirably suited to the weak cattle of the country. From what we have said above it is clear that although the North-West Agricultural Department costs Rs. 70,000 a year, it has nothing to shew in return for this expenditure." This is the kind of rubbish some of our native contemporaries, indulge in when writing upon public questions. This needs no comment.

Selections.

GERMANY'S FOREIGN TRADE.

The following tables show the imports and experts of Germany for the period, January—February this year as compared with the corresponding periods of the two immediately preceding years and 1883. All quantities in double centners two cwts. :—

Commodities	January and February 1887	1886	1885	1883
Imports.				
Pig iron	165,586	204,323	274 282	347,407
Scrap iron... ...	6,257	5 622	14,930	15,048
Iron and steel manufactures	68,154	35,590	65,176	65,059
Locomotives & portable engines	669	972	460	1,517
Machinery, incl. sewing machines ...	38,353	37,466	38 736	48,664
Iron ore	1,028,713	878 366	1,125 291	1 050,228
Coal	2 314 742	1,807 345	1,896,435	1,775,246
Coke	367 039	211,775	191,006	253 887
Brown coal ...	5,525,444	4,855 919	4 879,658	3,544,821
Chloride of potash ...	1,028,713	878,366	1,125 291	1,050 228
Corn and flour ...	19,694	20,980	117,716	85 754
Exports.				
Pig iron	356,212	539,188	431,815	344 728
Scrap iron	93,164	69,495	49 238	90,464
Iron and steel manufactures	1,630,054	1,310 982	984,636	1,283,864
Steel rails	790,913	181,012	167,560	268,011
Bar iron	348,485	205,514	190,143	213,149
Iron and steel wire ...	432 892	490 191	746 116	411,365
Raw sheets and plates	66,868	61,834	70 373	64,214
Inferior iron goods ...	87,586	93,501	79,040	80,733
Locomotives & portable engines	6 388	13,647	10,150	29,303
Machinery, inclg. sewing machines ...	92 928	76,737	90,883	93 968
Coal	14 412,058	13,878,699	14 779 878	13 518 388
Coke	1,168,271	947,867	1,050,591	910,606
Lead	38,571	58,193	53 922	54,145
Raw zinc	45,448	60 746	43 371	36 291
Iron ore	2 572 147	2,893 016	2,552,686	2 98,541
Beer	180,650	162,107	204 453	161,877
Sugar	754,852	462 854	1,438,608	1,017,740
Thereof—				
Raw Sugar ...	560,163	370 000	1,242 673	883,534
Molasses	14 055	11,633	61,069	14 258
Potash	83 259	72,068	61,958	59,390
Corn and flour ...	14,412,058	13.878,699	14 779,878	13,578 388

The following is a further list of the imports and exports for February, as compared with the same month of last year, and for January and February as compared with the previous corresponding period :—

Commodities.	February 1887	1886	January & February 1887	1886
Imports.				
Cotton	247 564	156 293	468,205	332,378
Cotton yarns ...	15,792	17 427	33,686	33,486
Jute	32 986	25,223	71,808	47,132
Potatos	20,182	20 058	34 959	31 582
Copper	9,595	7,095	18,563	15,959
Raw coffee ...	70,089	83 048	225,440	215,982
Rice	48,104	33,818	145,897	119,501
Tea	1,296	1,121	3 325	3,060
Grease	27,143	24,829	53 402	49,201
Petroleum ...	305,992	092 849	1 270,631	923,693
Eggs	18,084	11,657	36 698	22,807
Sheep's wool ...	135,661	16 918	231,400	178,529
Worsted ...	15,726	14,561	31,528	27,806
Exports.				
Cotton goods ...	25 467	23 676	53,504	45,524
Cement	171 851	162 586	253 677	239,087
Potatos	62 995	87 807	101 468	132,878
Glass and glass goods...	54 505	49,552	105 838	111,607
Hops	12 507	10 129	27 748	24,189
Musical instruments ...	7,756	7 932	15,426	15 517
Clothing, &c. ...	4,212	3,941	7,601	6 636
Leather goods ...	3,861	3 780	7 035	6,593
Butter	11,669	11,314	22,499	22,403
Table salt ...	30,478	41 393	59,829	27,179
Silk goods	4 752	4 032	10 397	8,760
Woolen goods ...	20,642	19,366	41,929	38,909

The following table shows the excess of the imports over the exports in the articles named :—

Commodities	January and February. 1887	1886	1885	1883
Wheat	683,856	659,302	3 602,141	1,576 263
Rye	471,610	573,181	2 322 377	9[illegible]380
Barley	594,989	785,112	1,306,343	762,547
Oats	7 650	795,431	417 370	215,289
Maize	207,244	221,563	286 599	177,800

We published some time ago the quantitative returns of the foreign trade of Germany during 1886, and we are now in a position to place before our readers the value in Marks, of the same, together with some further particulars. According to these last returns, which are non-official and published by the Imperial Statistical Office, the total imports of Germany for 1886 amounted to 16,940,488 tons, having a value of 2,955,928 000 mks., against 17 867,330 tons having a value of 2,980 969,000 mks in 1885; while the exports for 1886 totaled 18,924 283 tons, having a value of 3 111 928,000 mks. against 18 814 023 tons having a value of 2 915,257,000 mks. in 1885. It will thus be seen that compared with the previous year, the imports for 1886 have fallen while the exports have increased. In 1885 the balance of trade was against us to the extent of 7434 million marks, while last year it was in our favour by 15 million mks. In the first half of 1886 the crisis was still felt. It was only in the second half that the general improvement began to be experienced which promises to further develop itself. The figures of the precious metal traffic —included in the above returns—show that more gold and silver in bars and coins was imported to the value of 11 748 000mks; the increase in the export amounting to only 82,000 mks. The principal ground of this revolution in the trade of the country is to be found in the figures under the head of "foods and other necessary commodities" which show that the import has receded by nearly 71 million mks., while the export shows an increase of nearly 16 million mks. The import value of corn and cognate articles alone has fallen from 309 1/10 million mks to 215¼ million mks. We have before pointed out that the diminished import of corn has brought with it a decreased consumption, and that, to a certain extent, throws somewhat of a shadow over the otherwise very favourable returns. The export of industrial productions has substantially increased in a great many cases—a very favourable sign indeed. The export of silk goods shows an increase in value of nearly 33 mill. mks., woolen goods one of 13½ mill. mks., and hosiery one of 16 mill. mks. The export of ready made clothing, &c., has increased from 86¼ mill. mks. to 97½ mill. mks.; lace, embroidery, &c., from 38 2/5 to 59¼ mill. mks. fancy goods, &c., from 80 4/5 to 97¼ mill mks.; while the import and export of machinery, instruments, &c., show a falling off of respectively 9 3/5 and 27

mill. mks. The following altered figures are also noticeable. The import of cattle and other live beasts shows a decreased value of nearly 18 mill. mks., while the export shows an increase of more than 5 3/5 mill. mks. The export of sugar, syrup and molasses has increased from 623,903 to 635 321 tons. The raw materials of the fat industry show a decreased import of over 6 mill, mks., and also a decreased export of 630,000 mks., while the import of the manufactures has receded about 9½ mill. mks. and the export increased by 1 4/5 mill mks. The import of stone earthenware, porcelain, and glass goods shows a greater increase in proportion than the export. Leather goods of every description show an increased import of 800,000 mks., but against this there is an increased export of nearly 14 mill. mks. The import of raw and manufactured articles of the metal industry, excluding machinery instruments, &c., has increased from 169½ to 182½ mill mks., while the export has also increased from 336½ to 361 4/5 mill mks.—Our readers will be able to judge from the foregoing figures of the rapidly developing importance of Germany in the commercial world.—*Kuhlow's Review.*

AGRICULTURE IN EUROPE.

(FROM OUR OWN CORRESPONDENT.)

PARIS, APRIL 16.

IT is not a bad idea which the agriculturists of Verviers, in Belgium, have adopted—that of bringing out a "Herd-Book," specially devoted to the improvement of their local breed of cattle, to the amelioration of the best aptitudes for milking, while not neglecting excellence of form, and satisfaction for the wants of the butcher. It is curious that the farmers of the regions of Verviers exclude the Durham race—will not countenance it in any way. These, said genealogical family trees for local breeds of cattle, cannot be too warmly encouraged. At Louvain, in Belgium, also illustrates another progressive idea—that of the federation of local agricultural societies; four have become co-operative, and have secured thereby much economy, augmented power, and their united capital, credit, and knowledge resources enable them to obtain the best and cheapest seeds, manures, and machinery, while conducting, on special experimental fields, the testing of many points of new culture and usage, likely to be beneficial to the locality. An experienced authority asserts that he has increased by five-per-cent the yield of milk from his cows—and which his neighbours admit—by attending to the following simple rules:—Never worry the cows on their going or returning between the field and the dairy; milk them at uniform and unchangeable intervals, say five in the morning and six in the evening; let the operations of milking be performed as gently and silently as possible; and to remember, that passion and threats will not win the confidence of cows, nor will a blow in the flank be the means for dispelling their fear.

The only grain which succeeds in all soils is oats, due to the great development of its roots and leaves; that is, its organs of development. For spring oat as well as for barley and maize, the most economic and efficacious sources of azote, phosphoric acid, and potash, are nitrate of soda, the salts of Strassfurt; and the dephosphoration, clinkers, and phosphate of lime nodules, reduced to powder. The collective dose to apply depends on the richness of the soil, and the wants of the plant to be cultivated; the expenditure should, under the head of fertilisers for top-dressing spring cereals, be about 40 fr. per acre.

For barley, the Chevalier is the pet variety; for oats, the Canadian or the Hallet Tartary. The practice of farmers, residing in different and distant districts, exchanging grains for sowing, cannot be too highly encouraged. The vigour of a plant at its first stage depends uniquely on the reserve of aliment contained in the grain. This magazined food is destined to furnish the plant with all its nutrition, till the moment where the development of its roots and stem permits it to rely on the air and soil. Hence the importance of seed being dense, plump, fat and heavy, and the utility of sifting out of cereals intended for sowing all seeds, either light, small, or shrivelled. In the case of oats, 75 per cent of the grains germinate; for barley 88, and maize, 70. To germinate, oats must swell to the extent of 60 to 70 per-cent of their weight of water, and which is absorbed in soils of ordinary humidity in twelve or twenty-four hours. When the soil has a temperature of 65 or 66 degrees, germination will take place in the course of two-days; but not till eight days, if the temperature be as low as 39 degrees. Above 86 degrees, the grain will not germinate at all. On an average the germination is effected within six to seven days.

These conditions are modified by the depth to which the seed is buried; in compact clays, one inch of covering will suffice for soils of average consistency, 2½ inches in depth; while in light sandy land a covering of 3 to 3½ inches will be required. The growth of the plant commenced by the development of three rootlets; next by the first leaf. With a soil of 65 degrees temperature the daily increase of the stem is less than half an inch. Oats require a larger sum of heat to mature, than barley, and the average period of maturation may vary from 134 days as in England to 100 round Paris, and only 88 at Kœnigsberg in Prussia. Oats should be sown in 6 inch rows. Barley possesses the faculty to germinate at a soil temperature of 97 degrees, while oats can only sustain that of 85; this explains, why in warm latitudes barley replaces oats in the alimentation of stock. Barley will germinate after absorbing 55 per cent of its weight of water. Around Paris it ripens in 96 days, while in England it takes 127. Maize exacts only 44 to 50 per cent of water to germinate; from its appearance above ground till coming into flower, 45 to 105 days are required; 15 to 18 more for fecundation, and 40 to 80 days to mature. In France, the total mean time from the sowing of maize to its reaping, 104 to 180 days, and even more, are necessary.

Everywhere a kind of passionate attention is given to increasing the yield of wheat, either by reducing its cost of production, augmenting the productive power of the land, sowings in fines, or top-dressings with fertilizers. There is one homely operation to accelerate the common end, and which is not practised as much as it is profitable to do——harrowing and rolling winter wheat in spring, and which is eminently calculated to promote the stooling of the plant, and so to make two blades of corn grow where only one grew before. The harrowing should only take place when the soil is dry, the temperature mild, and the weather fine. A smart switch of the harrow will divide the lumps of earth already crumbled by winter; will favour the entry of air and heat to the rootlets, and destroy rising weeds. For clays, a light harrow with iron teeth will suit, but for lighter lands, the harrow with wooden teeth, or even a few black thorn shrubs tied together and changed when too much worn down. A rolling should follow; those who have a "Crosskill," can dispense with harrow and roller.

Since ten years, a professional agri-horticultural school has been established at Harone, in Lorrain, by Monsieur l'Abbe Harmand, for orphan girls, and which is conducted by the Sisters of Charity. The area of land attached to the institution is 35 acres; it is worked almost exclusively by the pupils and their mistresses. Practical every day instruction is not only given in household management and the elements of ordinary education, but in kitchen gardening, floriculture, small farming, the culture of fruit trees, vines, hops tobacco, &c.; dairy management, poultry, and the rearing of cattle. The school is a success, and the girls are eagerly sought as servants and wives. Would it not be time to make farmers at least as well-informed as their helps?

The Dutch milch cow, variety Frise, has attained a remarkable reputation, and within a comparatively short time. Indeed it is only since 1879 a special Herd-Book has been published, and which has at present on its register 1,194 bulls and 5,521 cows. For the benefit of importers, the Herd-Book Committee warns purchasers to buy no stock, whose pedigree is not authenticated. At the Agricultural Show held at Louwarde, the reputation of the Frise cattle, as milkers, was demonstrated; cows were milken under the supervision of a committee and yielded their 5½ to 6½ gallons daily at the two milkings. The weight of the bulls at that show, aged between two and four years, varied from 18 to 21 cwts.

In Belgium, farmers are compelled by law to keep down weeds on their holdings, so as not to allow propagation by the wind carrying away the seeds. The farmers have petitioned that the State should take the beam out of its own eye, by ordering that all the vacant land it owns be kept clear of weeds, and that the road-sides, especially, be maintained as a model in the way of freedom from weed propagation.

The truth is now making way that meadow lands require their fertility to be as much studied as tilled soils. Indeed when the grasses commence to get thin and dwarfish, when irrigation ... fails, something is wrong with the soil. It wants potash and nitrogen, or it may in addition be sour. If the latter commence by drainage and fresh linings, next apply fertilizers—such as potash or bone dust, singly or in the proportion of two of kainite and one of bone powder. This dosing will not only augment the yield but the quality of the grass. There was a time when potash alone was relied on as a sufficient top-dressing for pastures; it was concluded meadows contained a sufficiency of the other elements of plant nutrition. This belief has been of late shaken by the failure of potash to act as a heal-all because when phosphates are added, the efficacy of potash becomes developed, proof the

phosphoric acid was wanting and when co operating with an alkali the best action of both stimulants were obtained.

Tobacco culture is making rapid strides. The secret of success perhaps lies in the preparation of good compost, or mould manure, to form the nursery beds. The compost should be prepared twelve months in advance, and blood and urine will form excellent ingredients. The site for the beds should be such, as to secure sunshine from nine in the morning till four in the afternoon Many enclose the beds with bricks or boards, so as to keep the farm-yard manure (which ought to be two feet thick) and the compost, well together to produce heat; it is in March the seed is sown, for the young sprouting plants, against the chance rigors of spring Over the trampled, down manure, the compost should be placed. the first layer, three inches, and trampled; but the next left loose. Mix the seed with ashes and a little of the compost,sow broadcast, rake in, cover with matting, and regulate air and light, till the young plants are able to hold their own. If watering be necessary have the water in the pot exposed to the sun a day before being employed.

In planting out care must be taken to water liberally, so that the rootlets can readily take up sap when dibbled in the field, Water after dibbling. Good black, calcareous soil suits tobacco best. And the soil must be kept rich by winter manurings, and not too often stirred, as this might induce excessive porosity, and hence dryness The soil, before planting out, cannot be rendered too friable, by skim-plough, harrow, and roller. In soils not the best for tobacco culture, such should be well dosed with sulphates of potash and lime. Bad land produces tobacco without much flavour, and which burns badly. Dibble the young plant in firmly, 24 by 16 inches, in straight lines. If after some days any of the plants fade, replace them. Hoping, earthing, stripping off the lower leaves, and nipping the top shoot of the plant, so as to leave 8 to 10 leaves,is all that is necessary.The tobacco raised on plains,is more aromatic than that grown in a garden, while that produced on some southern slopes, is superior to both. Tobacco succeeds all crops, in a rotation, if the soil be rich. In Alsace, it follows best after maize and beet. Both the large and narrow leaved varieties of tobacco are cultivated. In France, the revenue officers insist, upon the plants being spaced at fixed distances according to defined regions. In the South, 4,000 plants per acre is the Government number, while the north, it is 20,000. In Alsace, 12,000 plants are limited to an acre.

The harvest generally takes place at the end of August, and the plant is considered ripe, when, on cutting the stem, a reddish circle appears. After being cut, some leave the plant a few days to fade : others transport it under sheds to dry, and later, roll the leaves in linencloths, or press them between bundles of oaten straw. The object is to obtain a leaf that will be at once aromatic and burn well. From five to fifteen cwts. is the average yield per acre in southern and northern regions, respectively

The question may fairly be raised—Is tobacco culture profitable? Many farmers will not hesitate to say : directly it is not, but indirectly, it is the best preparation for any succeeding crop.

Dr. Hector George, Professor of Hygiene, in the Agronomical Institute of this city, draws attention to the sanitary influence of light in favouring the formation of blood globules, and aiding all the functions of life to their fullest extent and intensity. Light revives and stimulates energy in the animal economy assists to purify air by destroying malaria germs, Light is salutary for the young by aiding growth and for the aged by filling sluggish nerve organs.

The annual Hippic Show in the Champs Elysees is neither better nor worse than in former years. It is the best out for livery stable men with "sticks," circus for gentlemen riders, and for ladies toilettes.—*Advocate of India.*

THE CULTIVATION OF POTATOS ON THE NILGIRIS.

The cultivation of potatos on the Hills dates from the earliest settlement of Europeans. Analogy of climate suggested its introduction to the first settlers, and experimental efforts were crowned with uniform success, for it took kindly to the soil and became in time a valuable addition to the food production of the district. In the early days of European occupation Government were disposed to assist settlers of energy and enterprise with advances of money for general farming purposes,the acclimatization of new products being one of the most important. The Kalty valley and Kulhutti were originally selected for experiments with potatos, and to this day these places retain a reputation for growing the finest tubers in the greatest abundance. Thence are derived the best potatos locally consumed and despatched to the plains. Their elevation ranges above 6,000 feet, an altitude below which this vegetable will not thrive, though we are acquainted with two experiments at 3,000 and 4,000 feet in the extreme North and South of the Nilgiris which were not quite failures. Up to within the last fifteen or twenty years the cultivation had not gone beyond the range of experiment, but each year the limits were enlarged with satisfactory results. Since then the strides have been rapid, and now it is well established among the agricultural classes, who find in it a lucrative and permanent livelihood.

The extent of land under potato is estimated at 1,000 acres, including large areas of semi-drained swamps within the town of Ootacamund. For these swamps growers pay at the high rate of twenty or twenty-five rupees an acre, and cultivate expensively. Though remunerative crops are obtained on such lands without much trouble the quality of the out-turn is inferior. The potato when boiled is found to be wet, hard, and waxy. Grown on the hill sides in the favorite localities to which we have alluded they boil dry and mealy, and possess good keeping qualities.

Two crops are raised annually, if the season is favourable, the one sown in February and lifted in July, the other shown in August and lifted in December. Although the climate of the Nilgiris is admirably adapted for sowing and reaping throughout the year, and thus securing a regular succession of new potatos, the natives adhere to the periods indicated and accordingly the market fluctuates considerably ranging very high just before crop time and falling below remunerative prices just after, when it is glutted. Indeed so great is the scarcity in the local market at times that it pays speculators to obtain a supply from Poona and Bangalore. The imported Poona and Bangalore potatos are inferior and innutritious, the eyes are deep set and on arrival the sprouts are well advanced.

The mode of cultivation is simple The soil is forked up before the frost sets in, in order that the sods may be thoroughly loosened and aerated by the action of the atmosphere. A week or so before planting it is pulverized and raked over, the furrows are drawn and the seed dropped with a handful of manure for each to rest upon. Weeding is carefully attended to and when the plants are six inches above the ground the first hilling takes place, followed by two or three similar processes before lifting. The yield averages two hundred maunds per acre, which at 8 annas a maund, pays the rent of the land, cost of cultivation, and a return of from 20 to 30 per cent on the capital outlay, according to the character of the season.

All field operations for potatos are manual, and therefore expensive. The plough is never used either in the preparation of the soil or in process of culture, probably because the implement does not turn up the soil sufficiently deep for a root crop.

The potato disease which prevailed in Europe with such virulence between 1875 and 1878, extended to this country and temporarily extinguished the cultivation in the swamp lands in and around Ootacamund Crop after crop was so extensively affected that the produce was not worth the cost of lifting, Growers preferred to allow it to rot in the ground, rather than incur the expense of removal. In the garden assessed lands surrounding the villages of the Hill ryots, the disease prevailed in a milder form, and growers were kept in countenance by the high prices obtained for the partial outturn. Science in England exhausted itself in trying to find a remedy for the disease which amounted almost to a national disaster. In this country not an effort was made either of prevention or of cure. The swamps were allowed to lie fallow in order that the disease spores might die out. As good seed as could be procured was purchased and sown, but beyond this nothing was done, and the disease was allowed to run its course, and, if possible, to exterminate itself, which, as might have been expected, it failed to do, The season in the current year, when perhaps the largest area ever put under the tuber was sown, has been most unfavorable. The incessant wet weather that prevailed during the most vigorous period of growth developing the disease afresh in its worst form To save the affected crops, growers lift as soon as the tubers are of moderate size, though immature. They are no sooner out of the ground than disease at once sets in and a few weeks suffice to render them fit to be consigned to the manure heap. It is unfortunate for this cultivation on the Hills, that the period when the disease is known to be most active is the period of sowing and reaping. This is in July and August, when the spring crop is lifted and autumn crop sown. A change in the present system of cultivation would under these circumstances offer some prospect of minimising the effect of the disease There is also in this country, to some degree, an absence of that noticeable folly in England, so potent for the propagation of disease, of trying to grow potatos of abnormal size ; though it is encouraging to learn that judges at Exhibitions and Agricultural Shows at home are, by the awards recently

made marking their appreciation of quality as distinguished from mere bulk. The features now commended at potato exhibitions are beauty of form elegance of proportion evenness, color and markings, clearness of skin and polish, but above all, superiority as an article of diet in the matter of nutriment These qualities are hardly yet brought home to the mind and experience of Indian growers, because the spirit of competition in agricultural produce is absent or awakened only at such long intervals that there is no sustained impulse given to improvement and the attainment of excellence. The opportunities for bringing together specimens of produce and comparing them one with the other are few and far between. The spirit of emulation is wanting, and year after year the dead level of mediocrity maintained with change, if at all, by way of retrogression and deterioration.

The most injurious practice in this husbandry on the Hills is that of cultivating year after year on the some soil without an attempt at rotation. Mismanagement in this respect is unversal. More remunerative crops would undoubtedly be obtained if alternated with other garden produce or with cereals. Until the ryot takes up potato cultivation more generally this can hardly be expected. Native speculators are not the class to look to for progress. As soon as the crop is ready to lift they dispose of it and leave the rest to the dealer who removes it in carts and despatches it to meet a demand, at present in its infancy, either on the Railway or in some of the towns with a considerable European population. Natives are rapidly acquiring a taste for potatoes, and as soon as they are cheap enough to become an articles of daily consumption in every Hindoo household, the cultivation will reach proportion of great magnitude, There are hundreds of square-miles of arable land that the hill tribes cannot profitably cultivate with their ordinary grains, but which put under this vegetable would maintain their owners in comfort. A rich soil is not indispensable, though liberal treatment with manure, other circumstances being favorable, would be well rewarded. The English cultivator raises from three to four times the crop that the native in this country does, but the latter is well satisfied with present results, and so long as high prices are maintained he will not be disposed to tax the soil to its utmost limit of productiveness. Natives appreciate the potato as an article of food, but its prohibitive price interferes to prevent increase of consumption. A rupee a maund places it beyond the reach of all but the well-to-do. Should the price fall to a-third of this figure, at which it will yet pay the grower well, a stimulus to production will be given that will terebie and quardle the extent of land brought under contribution—*South of India Observer*.

HORSE BREEDING

The Annual Administration Report of the Department of Horse-Breeding Operations of the Bengal and Bombay Presidencies for the official year 1885 86, is a somewhat bulky blue-book, bristling with statistical tables and appendices, yet it is very interesting and instructive reading, not only for those who interest themselves in the Indian Army Remount question and the supply of military transport animals, but for all who have the welfare and development of India's industries and resources at heart. The horses-breeding operations under review were inaugurated in the year 1876, in lieu of the Stud Department, which had been originally established as far back as 1794. Thus the present Report marks the last annual progress return of the first decade of horse-breeding operations in this country. The aim and ambition of the Department is to make India eventually independent of Australia, Persia. and other countries, for her horse supply, not only for the different branches of the service, but also for the requirements of the public at large, as well as to keep the money in the hands of home breeders and rearers by fostering this industry. The 1885-86 report is, on the whole, highly satisfactory, and the amelioration of the breed of country-horses is so promising, that next winter Beloochistan is to be included in the radius of stud operations. Thus, by encouraging horse-breeding as an agricultural pursuit, and not merely as a remount supply, this valuable industry will continue to spread. There are, however, suggestions in this report that it would be well for the Government to consider before valuable work is retarded, if not lost, through an injudicious application of economy. Firstly, it appears that the Department is under-manned. There are only five officers to superintend the operations over a vast extent of country. Of these, three have to visit tracts of land varying in size from that of France to that of Germany, thereby rendering impossible for the Veterinary Surgeons to visit annually, as is most desirable, all the breeding districts. Secondly, the number of Government sires is insufficient to keep pace with the branded mares. If these deficiencies are not rectified, the Superintendent affirms that the horse-breeding industry cannot be developed to the extent desired by the State. This is plain speaking, and coming from a man of such experience surely deserves to be considered.

It is evident that the half-bred Norfolk trotter is better adapted for the countrybred mare than either the English thoroughbred or Arab sire. They produce also the best stock for remount purposes The production of the English thoroughbred and country-bred mare is hardly satisfactory, being leggy and shallow in barrel, while the stock from Arab stallions is unreliable, some being remarkably good, whilst others turn out weedy. This is put down to the fact that the Arab horse now obtainable in Bombay and other Indian markets, is not so true bred as formerly—Arab dealers, in order to meet the demand for a larger stamp, of horse crossing the breed of Arabs and Persians, thereby gaining in height what they lose in substance. The importations into India of the Australian thorough-bred stallion for breeding purposes, though advocated has hitherto been a failure. The Rs. 2,500 allowed by Government is apparently not sufficient to induce the southern breeders to send really good horses, as in their own country a sire fit to breed from is worth from £500 to £1,000 It would, therefore, seem that the Norfolk trotter is the stamp of horse best suited for breeding purposes in India. Since the horse breeding operations have come into force, the class of country-breds has so much improved, that it is now urged that the Remount Department should purchase more of these animals for the British Service than hitherto; this, it is stated, would only be fair to the breeders and dealers who have been led to believe that such purchases, at higher prices than those given for the Native Cavalry, would be made. Judging from the favourable reports of officers commanding British Cavalry Regiments and Batteries to which Indian-bred remounts have been sent, during the last four or five years, this is a just and sensible recommendation. The Rs. 550 allowed for this stamp of horse would doubtless induce breeders to become rearers, and not part, as they are apt to do, with their very young stock. Australian horses are, it is true, available in any number at Calcutta and Madras, but if as good an article can be obtained at home, it is good policy to foster the local horse breeding industry. It is a significant fact that when, owing to the augmentation of cavalry in Bengal, last purchase season, there was a considerable increase in the demand for horses, not only was the supply found sufficient, (5,500 horses being purchased) but had another thousand been required, they would have been forthcoming. Notwithstanding the acknowledged improvement in the stamp of remount, the average price for Native Cavalry remounts is but Rs. 239-6, and, as is very truly remarked, in no British possession could such good troopers be got for the money. So excellent indeed is the improved country-bred stock, that English and Native dealers are said to give as high a price for them as for the generality of Australian horses landed in Calcutta or Madras. The annual prizes amounting to some Rs. 35,000, granted by Government to the Bengal and Bombay Presidencies, has been a great incentive to breeders and rearers to take advantage of these operations, and breed improved stock.

The question of Government runs, for young stock is discussed at some length in appendix C. The report is, however, unfavourable to this system of the reserve of young produce. To quote from the Superintendent's remarks on the subject :—"I am aware that it is the desire of the Remount Department to establish horse-runs, for the rearing of young stock. I am of opinion that if the Government interfere with horse-rearing, by establishing horse-runs for young stock purchased from breeders, the same grave error will be committed as was done in the old stud days, when Government purchased young stock and prevented breeders from learning how to rear horses Surely the experience gained during eight years of mismanagement, should be sufficient to prevent a repetition of the blunder." Further on he says that if the authorities are determined to have a reserve, colts and fillies of not less than two years of age should be purchased, as at that age a fair judgment as to future promise may be formed.

The mule-breeding operations which are carried on under the same superintendence are also on the whole satisfactory; and an annual increase in these useful transport animals may reasonably be looked for. The stock procured from the Italian and Spanish donkey sires is considered the best. Taking into consideration the increasing popularity of this industry in Bengal, and the consequent demand for sires, the same remarks as were made about horse-breeding, regarding the increase of stallions and the under-

manning of the Department, are applicable, and are duly commended upon by the Superintendent The maps attached to the Report, give a clear and comprehensive idea of the vast tract of country over which the operations extend, both in the Bengal and Bombay Presidencies.

TAPIOCA CULTIVATION IN MALACCA.

MALACCA, from the intricacy of the land question there, calls for a larger space than her sister settlements in the report of the Commissioner of Lands Titles. In that quarter, the revenue from land chiefly accrues from the business enterprise of Chinese tapioca growers, who indeed contributed 45,000 out of the 51,000 dollars collected under that head last year. The tenths on the produce realised from Malay occupiers of Crown land hardly total $4,500, an amount susceptible of material enchancement by a more thorough going assessment. Royalties on tin, timber, and jungle produce make up the balance. To swell the yield of the land revenue, the Commissioner of Lands Titles recommends the exacting of higher prices for forest land taken up by Chinese tapioca growers, the checking of encroachments, and the rigorous enforcement of terms of leases. The substitution of fixed assessment for tenths levied in kind, is expected to avail considerably in the direction of enhancement. However advantageous a cash assessment may be to the Government, its sudden introduction among a people not flush of ready-money, and long habituated to a land tax in kind, may impoverish the cultivators and bring them into the clutches of money lenders, as has unhappily been too often the case in India. Optional cash assessment may tend to facilitate the working of the measure. The changes outlined above will take years to come about. The Malacca land department in 1886, collected $61,765·49, nearly seven-hundred dollars more than in the year before. Sixty-two titles, disposing of Crown land were issued last year. On three large allotments of land wanted for growing gambier and tapioca, no less than $1,232 50 was realised as premium. In explaining the line of policy taken up by Government with regard to alienation of Crown land to tapioca planters the Commissioner of Lands Titles draws attention to the difference between European and Chinese ways in this branch of cultivation. Europeans in Province, Wellesley and Singapore, by free use of fertilisers and a businesslike mode of tillage, can keep on growing tapioca on the same piece of land for many consecutive years. The Chinese do nothing of the kind. To them it is more advantageous to clear and burn forest land for the purpose. Three crops prove in this case sufficient to exhaust the soil. They then move off to pursue the same destructive course elsewhere. The land subjected to this ruinous system becoming overgrown with long grass and jungle remains uncultivable for years. This style of cultivation, notoriously objectionable, has been put down in Malacca so far as Malay cultivators are concerned The Chinese however from motives of pecuniary gain have been allowed free play in this respect owing to their wasteful method bringing in a large land revenue welcome to those mindful more of present advantage than of furture loss. Were it impossible to keep a tapioca estate going remuneratvely more than five years after starting it, increasing its area by taking on additional stretches of forest land might be encouraged. But European experience tends to show that with manuring the same stretch of land can contiue productive for many years longer. Chinese planters grudge the expense attending the carrying out of this method and prefer to fertilise new land on the easy and cheap system of burning down jungle, no matter how detrimental to the public interest the whole sale destruction of forest may prove to be. If they are allowed to go on doing this without let or hindrance, the Chinese tapioca industry will come to an end, when the limited quantity of forest land available has all been turned to wasteful account. Tracts now valuable will become a wilderness of rank lallang and dense bush. With such a materialistic and money-making nation as the Chinese, gain is the primary consideration. By using Government timber as manure on an estimate, say 1,000 acres in area, a Chinese tapioca-grower may clear a net profit of 64,000 dollars on the first crop. As the forcing power of the jungle ashes diminishes, so does the yield of the second and third crops. Abandonment of the land follows as a matter of course. The Chinese system comes, in short, to using Government timber as a cheap fertiliser, instead of the manure which European planters employ at a profit, which the Celestials find too troublesome to gain. They can well afford to pay high for the timber which serves them in such good stead for fertilising purposes. The higher revenue sure to be raised by charging them heavily for the privilege may prove, welcome windfall to the Colonial Treasury in these hard times, but lies open to the objection of precariousness, owing to the limited extent of forest land suitable for tapoica cultivation. In these days when the advantages of preserving forest are becoming more and more manifest frudential considerations would suggest the advisability of reserving what little forest land the Government has left. The additional revenue realised for a while, forms a poor set off against wide stretches of jungle, land which will take years to recover from the exhaustion brought on by the free-play of Chinese greed.—*Straits Times, April 23, 1887.*

CHEMICAL EXAMINATION OF COCA LEAVES.

I HAVE much pleasure in reporting to you the results of my first attempt at the chemical examination of the leaves of Coca Erythroxylon, which you were good enough to obtain for me. One portion of the sun-dried leaves yielded ·544 per cent of crude cocaine alkaloid another smaller portion of the sample which I treated with fully one and a half times the proportion of solvent used in the first case, yield ·648 per cent of crude alkaloid. These results are good, but the total amount of alkaloid obtained from the quantities of leaves operated on seemed to me too small viz, 4·2 and 2·6 grains respectively, to admit of an acculate determination of the pure alkaloid being made by the process followed. In assaying the leaves by this process, indeed, it is not customary to proceed further than the actual determination of the crude alkaloid. Determinations on the large scale shew the proportion of impurities (another alkaloid called hygrine, and decomposition products) which usually accompany the crude cocaine, and a corresponding deduction being made from the impure alkaloid obtained by assay the difference is regarded as a close approximation to the amount of pure alkaloid. I should like to obtain a larger supply of leaves, both for the purpose of trying other methods of extracting the alkaloid, and also to determine for myself the amount of purified alkaloid obtainable from the crude alkaloid. I have before me two leading chemical journals in both of which the process I used is given, yet the one authority states (giving instances from actual working) that the crude alkaloid usually contains from 20 to 25-per-cent of impurities, while the other authority gives no examples, but states that the crude alkaloid "contains on an average 20-per-cent. of alkaloid with much impurity." The crude alkaloid which I obtained was a clear, almost colourless substance, resembling varnish, which by and bye crystallized, the crystals spreading out from star-shaped nuclei. The crystals, even after long drying, remained somewhat viscous to the touch. A small portion when laid upon the tongue and pressed against the roof of the mouth had a slightly bitter taste, and about a minute, there was experienced an increasing feeling of numbness. The effect which was not very strong, but quite marked, passed completely away in a few minutes. A portion of the alkaloid obtained was dissolved in hydrochloric acid to a clear and neutral solution and evaporated to the consistency of varnish After standing for some time and being stirred it changed its physical condition to what looked like a moist, nearly white amorphous powder, but under the microscope its structure was revealed as a mass of clear but very minute prismatic crystals. This is the cocaine hydrochlorate, the use of which as a local anesthetic is now fairly established. A little of it placed upon the tongue soon produced a sensation (or want of sensation) resembling that of a painless blister I dissolved the salt in water adding a minute quantity of salicylic acid to prevent the growth of low organisms in the solution. I have sent you a portion of this solution, which is clear and but slightly tinged with colour. A good way to test the effect of it on the mucous membrane of the mouth is to put a drop of it on a small piece of blotting paper which is then pressed between the tongue and the roof of the mouth A comparatively short time ago, the crystallized hydrochlorate of cocaine was retailed in Colombo at Rs. 2 50 per grain, now it may be had for 25 cts. per grain.

As I have not in the course of my reading seen any analysis of the ash of coca leaves, I used a portion of the sample of leaves to make an analysis of the mineral ingredients left after burning the leaves. This is interesting, as showing the inorganic matter removed from the soil by a crop of coca leaves.

The sun-dried leaves gave off 10 8 per cent of moisture, when dried at 212° Fahr., and when burned, yielded fully 6 per-cent of of ash, including carbonic acid, which is not an ingredient of the leaf, but a product of combustion. The following are the detailed results :—

Composition of the ash of coca leaves.

Silica	3 06
Oxide of iron, &c.	3 38
Lime ...	27 86
Magnesia ...	8 50
Sodium chloride	5 74
Postassium chloride	1 26
Potash ...	13·94
Phosphoric acid ...	16 81
Sulphuric acid ...	4 61
Carbonic acid ...	14 84
	100 00

Since writing the above I have come upon an interesting research into the composition of tea leaves, in the January number of the *Journal of the Chemical Society*, which, by analogy, may throw some light on the discrepancy of the two authorities referred to on the matter of the amount of pure cocaine obtainable from the crude alkaloid. O. Kellner has made systematic analyses of fresh tea leaves plucked from May to November and it would appear from his tables of analysis that the amount of ethereal extract and of the alkaloid theine are variable, and in something like inverse proportion to each other. In May the amount of ethereal extract was 6·48 per cent and the theine 2 85 per cent calculated on the dry leaf, while in November the figures were 22 19 and 1 00 respectively. The constituents of the ash show similar changes. The potash *e g.*, in May, constitutes 49 06 per cent of the ash, and it gradually decreases, till, at the end of November it is only 17 3, per cent. Conversely the lime in May is 11·95 per cent. and at the end of November 30 46 per cent. M. COCHRAN, *in Tropical Agriculturist.*

THE INDIAN JUTE INDUSTRY.

Better late than never would be an appropriate motto for the Indian Jute Manufacturers' Association to adopt. Taking into account the fact that the industries, in connection with that important article of commerce, have largely developed within the last decade or two, it is strange that the agents of the several mills should have so long abstained to combine for the protection of their common interests. They have, however, acted wisely in taking action in the matter, and a well-known Armenian gentleman, himself the moving power in a large concern, is to be congratulated on his successful efforts in organising an Association in the middle of 1884, with the help of some of the leading members of the mercantile community.

From the several reports of its operations before us we find that although it made very little progress in the first six months, in course of time its sphere of usefulness has been increased and a great deal has been accomplished. The important questions which engaged its attention at the meeting of the 25th September 1885, were, the reduction of the manufacture of gunnies in the depressed state of the trade, the reduction of the wages of weavers and other native operatives, the opening out of new markets for jute manufactures, and the settlement of a form of contract for general adoption which should be equitable to all at the same time.

The first question was fully gone into, and it can hardly be denied that the present unhappy condition of the jute trade is in great part due to a want of combination among the agents and directors of the several mills. The majority of the concerns were working at a dead loss and so long as the prospects were not more cheering it was advisable that they should restrict the loss to as small a figure as possible. This could only be attained by curtailing or ceasing manufacture and not by continuing to work at full power, which, to an unprejudiced mind would appear to be axiomatic. But, as we have said above they ignored the principle that union is strength, and while a few are working short time, others have closed in expectation of better times reviving in the near future when they would resume business on the former scale. And what has been the result of this isolated action?—instead of any improvement being observed, matters have drifted from bad to worse, and something like a general dead-lock is the outcome.

Now, immediately connected with this question is the other one of reduction of wages, in which also it was found that unanimity could not be arrived at. The Chairman proved conclusively that as the weavers were paid on too high a scale, their weekly earnings being double those of the spinners, he advocated a reduction of 25 per cent. which could not fairly be objected to. The w[illegible] being recruited from spinners and being attracted by a high [illegible] of wages, there was a falling off in the number of spinners, wh[illegible] if this great discrepancy in the earnings of these two sets of workers were reduced, there would be no difficulty in procuring a large number of spinners, and equilibrium would be preserved. This is as clear as day-light, but some of the members of the Association would not see it till that stern disciplinarian, self-interest, brought about a change in their views. Of course the men were not slow to take advantage of this disagreement among their employers, and the paths of the firms, who were foremost in initiating the movement, were beset with difficulties. The mill "bands" joined in a general strike, but they discovered their mistake before it was too late, and had to submit to the new terms. There was a ray of hope in this for the concerns that were opposed to the movement, and they, too, adopted the plan, but without experiencing the inconvenience of having their employees going on strikes, which might have been averted altogether but for their determined obstinacy.

In regard to the general complaint that the supply is greater than the demand, there is only one way that presents itself of cutting the Gordian knot of the difficulty,—*viz*, by opening new markets for the product of Indian jute mills. It is a subject which deserves the serious consideration of the Association, and could not be postponed indefinitely. We admit there are great obstacles in the way of getting a footing in distant countries, which at present consume a small portion of the manufacture, or where it is not known at all; but until such an outlet can be discovered the prospect of the jute industry in India cannot be expected to improve.

It is unfortunate that Government will not see its way to offer encouragement to British enterprise in this country. The arbitrary manner in which the License Act II. of 1880 has been worked to the prejudice of such undertakings tells its own tale and adds to the troubles of the Association. The Collector of Calcutta assessed some of the companies under class I, that is, at the highest fees leviable under the Act, although they have been worked at a dead loss for some time past. The Association brought the matter to the notice of the Collector and the application was summarily rejected; the Commissioner of the Presidency Division was appealed to, but with no better success. As a last resort, the Lieutenant Governor was memorialized; he, too, could not hold out any hopes of relief, and there the matter rests for the present. The Committee, however, remark that "they by no means accept the justness of the decision which has been passed, and do not disguise from themselves that it appears, that the whole subject is one rather of the productiveness of the tax than of the strict and fair application of the terms of the oppressive law,—a law confessedly unfair, as it provides for a contribution to the funds of the State [illegible]m special classes of the population."—*Indian Engineer*.

INDIAN COFFEE.

Regarded as a mere show, from the sight-seer's and the pleasure-seeker's point of view, it will, we think, be readily admitted that the Indo-Colonial Exhibition held at South Kensington last year was pre-eminently successful, as would appear to be evident from the fact that during the six months it remained open, it was visited by no less than 5,550,749 persons, giving a daily average of 23,071; and as a means of popular instruction also, it may safely be assumed that it has not proved altogether ineffectual, but, operating as a gigantic series of practical "Object Lessons," has served to dispel many erroneous notions from the public mind, whilst conveying fresh impressions of the "wonders of the world abroad." Nor has it proved a failure from a pecuniary point of view, for Reuter informed us the other day that the final report of the Commissioners declares the respectable surplus of £35,000, of which £25,000 are to be devoted to the Imperial Institute. But we have yet to learn how far it is likely to be productive of substantial results in the direction of promoting the commerce of the various colonies and dependencies that were represented at the Show. A special feature of the Exhibition was that no juries were officially appointed to pass judgment on the exhibits and award medals; so that until some kind of official reports are drawn up by experts and specialists with the object of determining the comparative value of the multifarious exhibits, the outer world will be left to form its own estimate as to the practical outcome of the Show. Some such official *pronunciamento* will we dare say be forthcoming some time hence; but meanwhile we have some kind of guide to fall back upon in a handy volume issued under the auspices of the Council of the Society of Arts, London purporting to be "Reports of the Colonial Sections of the Exhibition" drawn up by experts and edited by Mr. H. Trueman Wood, M. A., the Society's Secretary. It is claimed for this work that it will serve to inform English dealers and manufacturers of the resources of the Colonies, whilst acquainting Colonial producers of the requirements of the English market. The work embraces twenty-three reports, written by specialists, beginning with mining industries and ending with musical instruments. For Mysore readers the report drawn up by Mr. A. G. Stanton on Indian tea and that on coffee by Mr. Henry Pasteur, will have special interest; and we, therefore, pass over the other reports for the present in order to deal immediately with what directly concerns producers in this Province.

Confining our attention more particularly to what Mr. Pasteur has to say about coffee, we are not surprised to find it recorded that leaf disease has hitherto been the chief draw back to the development of the coffee industry in this country. It is, however, encouraging to be assured that notwithstanding the infinite care necessary to the culture of the plant and the preparation of the berry, India now stands foremost among the British possessions, both in respect to the quantity and quality of its production. The coffees of Mysore, Coorg and the Neilgherries are acknowledged to have always been and are likely to continue in high favour with the buyers for home consumption. Our Planters however would do well to give their most serious attention to Mr. Pasteur's references to certain experiments that have been tried with a view to determining the best method for sending coffee home for market. When looking at the fine samples which were exhibited in the Ceylon Court, says Mr Pasteur, one could not avoid a feeling of sadness and regret at the thought that they represented only the last vanishing remains of what were but nine years ago, the most extensive and flourishing of the coffee crops raised in British soil by British enterprise and capital. The product, which in 1873 amounted to nearly 1,000,000 cwt. declined to 230,000 cwt. in 1885. Even the Liberian coffee, from which so much was expected, has succumbed to the disease. For other reasons also Mr. Pasteur thinks the culture of Liberian Coffee for the home market should not be encouraged in any of our Colonies. Notwithstanding the failure of the plant in Natal, he thinks that country admirably adapted for its culture, and believes that, with care and intelligence, it ought to succeed. Jamaica, however, which so far has been exempt from enemies of the plant, Mr. Pasteur thinks is the most hopeful of our Colonies for the investment of capital in coffee plantations. In concluding his report, he animadverts in justly strong terms on the treatment to which coffee is subjected at the hands of the British Government. Almost any sort of rubbish, including pounded cockroaches, is allowed to be sold under the name of "French coffee," a state of things extremely adverse to the increasing use of the genuine beverage.

STUDIES IN NITRIFICATION.

(By Professor Fream, B.Sc Lond.)

In relation to agricultural, no less than to sanitary matters, there is probably no chemical element around which there, at the present time, centres so much interest as is the case with nitrogen. The changes which nitrogenous compounds undergo in the soil before they can become available as plant food; the significance attaching to the presence or absence of nitrogenous compounds in drinking and other waters; the question as to the profitable utilisation of the nitrogen of sewage, and the intimate relation which nitrogen is known to bear to all forms of plant and animal life—these will serve as a few illustrations of the fertile paths of investigation which all converge upon nitrogen.

Since the discovery, some ten years ago, by Schlœsing and Müntz, that nitrification, that is, the conversion of the nitrogen of organic compounds into the form of nitric acid, is associated with the presence of a living microscopic organism, the field of exploration has been gradually widening, so that in England, in France, and in Germany, it has already attracted very capable workers. At home the lead was taken by Mr. R. Warington, F.R.S., who has been followed by Dr. J. M. H. Munro, F.C.S., and I propose to briefly notice some of the recent works of these gentlemen, as laid by them before the Chemical Society.

I have on several previous occasions brought under notice, in these columns, Mr. Warington's work. His latest investigation bears the title "On the Distribution of the Nitrifying Organism in the Soil," and his experiments were made in the Rothamsted laboratory. In a former investigation Mr. Warington was led, from the results of three series of experiments, embracing 28 trials, to conclude, as follows:—That in our clay soils the nitrifying organism is not uniformly distributed much below 9 inches from the surface; on much slighter grounds it may perhaps be assumed that the organism is sparsely distributed down to 18 inches or possibly, somewhat further; at depths from 2 to 8 feet there is no trustworthy evidence to show that the clay contains the nitrifying organism. It is however probable that the organism may occur in the natural channels which penetrate the sub soil at a greater depth than in the solid clay, in the case of sandy soils we may probably assume that the organism will be found at a lower depth than in clay.

In his subsequent inquiries Mr. Warington has experimented with fallow soil and with soils carrying white clover, red clover, Bokhara clover, and lucerne crops, respectively and the general result is to indicate that the nitrifying organism may occur at a considerable depth in a subsoil of loam or clay but that in such case it exists in small quantity and in feeble condition. The comparatively feeble power of the organisms occurring in the deeper layers is shown by the greater length of time which a sub soil requires to start nitrification, as compared with a similar quantity of surface soil. The very practical question arises as to weather nitrification occurs in all depths of the sub-soil at which the nitrifying agent exists. As to this, Mr. Wrington is strongly of opinion that nitrification is practically confined to the surface soil, and occurs rarely, and to a very small extent, in a clay subsoil removed two or three feet from the surface. He points out that all the conditions favourable to nitrification are present to a far greater degree in the surface soil than in the subsoil; that the surface soil is in the majority of cases far richer in nitrogenous matter suitable for nitrification than the sub-soil; and that at the surface also the amount of oxygen available is immeasurably greater than it is below. He maintain that the principal hindrance to nitrification in a clay sub-soil is the impossibility of obtaining a sufficient circulation of air at considerable depths.

That very little production of nitrate occurs in the subsoil is confirmed by evidence afforded by the drain gauges at rothamsted. The quantity of nitric nitrogen annually found in the drainage waters, has, on an average of nine years, been as follows:—

Soil 20 inches deep,	40·2 lb	per acre.	
,, 40	,,	35·0	,,
,, 60	,,	38·8	,,

Moreover, if after a cereal crop, which has removed the nitrates from the soil, the land be cultivated during the next summer as a bare fallow, the nitrates formed during this season of rest and tillage will be found chiefly in the surface soil, unless heavy rain has occurred to wash them below. It is pointed out that the presence of large quantities of nitrates in a sub-soil is no proof that they have been produced there; their occurrence at this depth is a natural result of drainage and diffusion in the absence of a growing crop capable of removing them from the soil. In connection with this matter, the conservation of nitrogen by permanent pasture will occur to many readers. A thoughtful paper on this subject, by Mr. Bernard Dyer, entitled "The Fertility of the land," is to be found in one of the current agricultural almanacs.

The conditions which favour nitrification in the sub-soil are, Mr. Warington points out, such as enable air to penetrate it—artificial drainage, a dry season, or the growth of a luxuriant crop causing much evaporation of the water of the soil.

Dr. Munro's paper on "The Formation and Destruction of Nitrates and Nitrites in Artificial Solutions and in River and Well Waters" is a record of investigations carried on chiefly at Downton and possesses many points of interest, both agricultural and sanitary. It is, he remarks, a matter of common knowledge that the ammonia and nitrogenous organic matter which find their way say, in the form of sewage, into our rivers and wells, ultimately give rise to the formation of nitrates: and the proportions of "free ammonia" and "nitrogen, as nitrite and nitrate," have had their place in our analytical schemes as measures of sewage pollution "present" and "past." Only a few investigations, however, have been made as to the exact manner in which the transformation of ammonia into nitrite or nitrate is effected; and such as have been made have proceeded upon purely chemical lines, the rapid aeration and large surface exposure which moving water undergoes being tacitly or openly inferred to be sufficient cause of nitrification. One object Dr. Munro had in view was to ascertain whether natural waters oxidise ammonia because of their contact with soil and the ferment contained therein, or because they themselves contained this ferment which they have obtained from the soil, or simply because they offer the ammonia the means of free and thorough atmospheric contact. With one exception, he found that all the natural water he examined possessed the nitrifying power in a greater or less degree. Polluted well waters appeared to be the most potent, then surface waters, and, lastly, pure and efficiently protected wells. Very deep well waters may perhaps be either free altogether from the nitrifying organism, or contain it in such small quantities as to require a very lengthened period of incubation.

In the following words Dr Munro very clearly states some important facts:—The soil is the abode of many ferments, some of them having opposed functions but all lying in wait for suitable conditions which shall encourage one species for a little time until it has done its work and has brought about an alteration favourable in turn to the encouragement of another species. Form the soil these ferments pass into the waters from which they are not completely removed even by filtration and the nitric ferment—certainly one of the most subtle of them all—seems little affected by this process. The addition of any ordinary organic matter instantly excites activity in one or other of these ferments and the effect is soon visible to the eye by the impared clearness of the water, and to chemical tests by the effect produced on the nitrate of the water. It is by no means nesessary that this organic matter should be that commonly regarded as putrefiable or even like sugar of a nature long recognised as easily fermentable. On the contrary these soil and water ferments do not spare such simple organic compounds as acetates and oxalates. Hence the organic matter of potable waters can be only such organic matter as is non fermentable or at any rate not rapidly or easily fermentable. An unpolluted well water should be perfectly clear, with ammonia and nitrite absent, or present in barely measurable quantities, and with nitrate always present, but in strictly limited amount. As regards nitrate, it may be added that clean rain-water and the water of mountain streams often contain but a trace: well and river waters *must*, however, contain more than a trace, unless some cause has brought about the destruction of previously existing nitrate. This cause is the access of fermentable organic mattor to the water, and in most cases the fermentable organic matter is derived from sewage.

In discussing the important question as to whether organic carbon is essential to nitrification. Dr. Munro is led to the conclusion that the merest traces of organic matter, such as may be furnished accidentally by an occasional exposure of a solution to the dust of the air, were sufficient for the complete nitrous fermentation of the quantities of ammonia used in his experiments. Further the organic matter of oven to small a quantity as 1 or 2 milligrammes of soil suffices for the requirement of a complete *nitric* formentation. In this connection I may call attention to a paper by W. Heraeus, "Ueber das Verhalten der Bacterien im Brunnenwasser, sowie uber reducirende und oxydirende Eigenschaften der Bacterien." This paper has appeared since Dr. Munro's, and is published in the *Zeitschrift für Hygiene* at Leipzig. In the course of his paper Heraeus makes, in effect, the following statement:—Extraordinarily striking was the result of these experiments in regard to the circumstance that a multiplication of bacteria took place in a solution which contained no organic matter, but only salts. An inconsiderable, scarcely visible, aggregation of bacteria had, in the course of ten days multiplied so freely that the whole surface of the fluid was covered with a thick pellicle. It is regarded as one of the essential principles of vegetable physiology that only chlorophyll-bearing (*i e.*, green) plants are able to assimilate carbonic acid, but all others, including, therefore, the chlorophyll-free bacteria, require the presence of organic matter. Whether and how the result of the experiments indicated would be brought into agreement with this accepted doctrine must provisionally remain undecided.

I may here refer to a paper by MM. Barthelot and Andre, "Sur les principles azotes de la terre vegetable," published in a recent number of the *Comptes Rendus*, and containing an excellent summary of the growth and present state of our knowledge concerning the nitrogen of the soil.

The whole subject, of which only a few detached fragments have been referred to, is of high practical interest and importance. Though concerned primarily with nitrogen on the chemical side, it is pregnant with potential discover on the biological side. Every addition to our knowledge of those minute organisms—microbes—which lie at the limits of the visible world, is welcome and useful. We can, indeed, know little of them, save by their effects, but any additions to our knowledge of the manner in which the nitrifying organism performs its mysterious duties in the soil, will possess a double value, in that it will help collaterally to throw light upon the behaviour of other but similar organisms, which appear to be inseparably associated with anthrax, typhoid, and other malignant disorders, to which man himself, not less than his domesticated animals, is so prone a victim.—*Mark Lane Express.*

The C. and M. *Gazette* writes: "We have received (on the 6th of May) the *Indian Agricultural Gazette*, dated March 31st, and under the heading of "News," we find the prospects of the Punjab wheat crop to the end of January. A little more energy on the part of our contemporary, and we shall soon be able to learn whether there was likely to be a good harvest the year before last."

H. M. STANLEY'S MEDICAL OUT-FIT.

"ANYONE who reads Stanley's books can hardly fail to see the exceptional nature of the man whose name is specially suggested to the mind whenever mention of Africa is made. His is scarcely the type, we venture to think, thats our civilization tends to produce; yet, however cautious, self considerate, and conservative a man may be, he cannot but admire courage. Emerson says the reason why courage and bravery are so highly lauded is because so few are brave. We are by no means of those who believe that courage is anywhere near dead, for whatever emergency may arise there will be brave souls to meet it. A thousand men start with Mr. Stanley to cross a country where manifold dangers threaten, on every hand. *Their* names are unknown; *they* are the novices, and there is the same difference between them and their guide that there is between the young sailor-boy and an "old tar." The one it callow yet; the other toughened with many winds and storms.

A few days before he started we had the pleasure of meeting Mr. Stanley. We had read in his pages how to live long in Africa, and we were anxious to see what manner of man he was, who had withstood the fevers and terrible moist heat of Afric's fertile coast. We were introduced to a man of about 5 feet 8½ inches, tall, with a chest of unusual demensions for one of his height; His neck was rather short and thick, than otherwise; his body long, and his arms and legs a trifle short. His muscles, as evidenced by his hands and face, were made to endure. Before speaking further, we confess that we should have attached more value to Mr. Stanley's advice on how to live in Africa if we had seen a less perfect specimen of physical development; for it must be acknowledged that his physique has had much to do with Mr. Stanley's success. Coming to the facial part, the hair, slightly silvered, grows low upon the forehead. The nose is not large, and the lower jaw recedes, but only a very little. The head is of a good size, with full development at the back part, and indicates power. Mr. Stanley seems a quiet man, of indomitable will and energy, with a percing sturdy eye.

"At the time of our visit, we saw on the table one of those remarkable medicine chests, of which the great explorer speaks in his works. When one sees the complete list of drugs and instruments, and the wonderful and exquisite way in which they are prepared, he cannot but think that an ordinary chemist ought to be ashamed for occupying so much room, when like the "old woman," he might almost keep his physics "in his shoe." The chest was designed and fitted up by those enterprising chemist, Messrs, Burroughs, Wellcome, & Co,, of Snowhill-buildings, London. We cannot give its contents, but many will, doubtless, be interested in a sketch of it.

"The chest itself is of raw hide, soaked in corrosive sublimate, and then varnished. It is therefore durable and waterproof, insects will not touch it; and it is so light that it can be carried with the little finger. The corner pieces are hide secured with copper rivets. The bottles are square, close-fitting., and some of them are metal with screw caps. The medicines are mostly in the form called "tablets,,' which are the pure drug compressed into the doses required, thus doing away with the necessity of scales, or the danger of mistakes. Families, travellers, &c-, can get medicine chests for their private use on a similar and smaller scale —indeed, of almost any size they want, however large or small. Inside the lid is given a list of all the remedies the chest contains, with the uses of each drug. There is also a printed label on each bottle, giving the dose and uses of the medicine it contains."

The British and Colonial Druggist says: "Amongst the drugs we noticed the celebrated "Livingstone's Rousers," composed of quinine, calomel, jalap, and rhubarb, also quinine alone in (tablets of different weights), antipyrin (for fevers) opium and lead, which, by the way, is a remarkably soluble preparation; that excellent anti-malarial tonic of quinine, arsenic, and stychnine, opium and camphor, &c, besides a complete set of hypodermic appliances, and the tablets appropriate to this mode of administration, while zymine and peptonizing powders must not be ommitted." Hazeline, eucalyptine, beef and iron wine (Burrough's), and that beautiful topic, the elixoid of quinine, iron and strychnine, were in the larger bottles.

"Space was also found for clinical thermometers, an enema, syringe, wound pads, surgical instruments and dressings, and, to cap all, there was a special treatise called the "Traveller's Guide," a book replete with cautious "wrinkles," and good "tips," and sound medical lore. Every-one should read this little brochure, and no one should be without it.

"It is just the book which medical men have been in need of to recommend to their patients when travelling, and will be of special use to colonists in out-of-the-way places, as well as to explorers and missionaries, who are so often placed out of the reach of medical advice.—*Health.*

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VOL. XII.] CALCUTTA :—SATURDAY, MAY 28, 1887. [No. 22.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 19TH MAY, 1887.]

Madras.—General prospects good.

Bombay.—More or less rain in parts of thirteen districts. Lands being prepared for *kharif* cultivation everywhere, and early *kharif* sowings commenced in parts of five districts. Fever and cattle-disease in parts of ten, small-pox in parts of eight, and cholera in parts of four districts.

Bengal.—Weather hot and sultry. Rain fell in all the Bengal districts, but in Behar scanty showers fell only in the districts north of the Ganges, and in Orissa and Chota Nagpore the fall was also scanty. General prospects are favourable. Ploughing and sowing are in good progress, but more rain is wanted in parts of the Burdwan, Rajshahye, and Bhagulpore division, and in Cuttack. *Boro* rice harvest is still going on. General health has improved, but cholera is prevalent in several districts.

N.-W. P. and Oudh.—Weather very hot, with high westerly winds. Sugarcane and indigo crops promise well, and are being watered. Supplies sufficient, though prices show a tendency to rise. Cases of cholera and small-pox continue to be reported, the former is said to be in epidemic form in two districts. Some cattle disease reported from four districts, elsewhere condition of cattle is good.

Punjab.—Slight rain has fallen in the Umballa and Ferozepore districts. Health fair in Hissar and Peshawur, elsewhere good. Except in Delhi, Ferozepore and Rawul Pindi, where they are rising, prices are stationary. *Kharif* sowings are in progress in the Umritsur, Sialkot and Mooltan districts. In the Umballa, Jullundur Rawalpindi, Shapore and Peshawur districts the *rabi* harvest has been below the average.

Central Provinces.—Weather hot and sometimes cloudy. Lands being prepared for *kharif* sowings. Fever, small-pox and cattle-disease in places. Prices generally steady.

Burmah.—Slight cholera in parts of Lower Burmah. Some cattle disease in parts. Reports received from six Upper Burmah districts. Some cases of measles and small-pox in Myningyan. Crops doing well.

Assam.—Weather rainy. *Boro dhan* reported to have been infested with *sihu* insects in Patl Darrang. Cattle-disease is also reported from this and Karimgunge tehsils. Ploughing and sowing of *dumai* and *murali* crops nearly finished. Cultivation of *sali* crops commenced. *Kathia* being sown. Prospects of *ahu* and other crops good. Tea not doing well. Public health fair, except cholera in Hailakandi, Cachar. Prices steady.

Mysore and Coorg.—Slight rain in parts. Standing crops in good condition. Prospects of season favourable. Public health good. Small-pox and cattle-disease continue in affected parts. No material change in prices. Coffee prospects have suffered in South Coorg from rain and hail.

Berar and Hyderabad.—Weather hot, with high winds and occasional storms. Ploughing for *kharif* and reaping of *Abi* crops continues. Isolated cases of small-pox in Akola; cholera still prevalent in Hyderabad and talukas, otherwise public health good. Foot and mouth disease among cattle in Akola. Prices steady.

Central India States.—Weather seasonable; slight rain in parts. Prospects of crops good. With the exception of small-pox in Morar and Goona, public health good.

Rajpootana.—Weather seasonable, with high winds; slight showers in places. Tanks and wells generally diminishing. *Rabi* crops being harvested, and ground being prepared for *kharif* crops. Prospects favourable. Cattle-disease prevalent in Ajmere. Small-pox and fever in Kerowlee, Dholepore and Bickanir, otherwise public health good. Prices fluctuating.

Nepal.—Weather stormy, with constant showers. Indian maize being sown. The spring crops have been fair.

Letters to the Editor.

JENSEN'S CATTLE-FEEDING OIL.

TO THE EDITOR.

SIR,—In a recent issue of your journal you wrote at some length about Jensen's cattle-feeding oil, adding that experiments are in progress in this country about the desirability of its introduction into India. Will you favour me by kindly publishing where, in Calcutta, this oil can be had, and at what price? In an advertisement in your paper I find testimonials from such emminent agriculturists as Sir Charles A. Cameron, Edward E. Barclay, and the Earl of Harrington. Is the oil efficacious for our poultry?

SASI B. BISWAS,
Editor, *Indian Workman.*

5, Koolia, Tengra, May 16, 1887.

NOTE.—We are not aware of any agency in Calcutta for the sale of this oil.—ED., *I. A.*

DE-HORNING CATTLE.

TO THE EDITOR.

SIR,—In a recent issue of your valuable journal, I came across some extracts as to the de-horning of cattle. The pain caused (though the infliction of any pain on animals should be avoided as much as possible), is not very considerable, and is not in any way greater than that of castrating, and other similar operations, so that it may be altogether left out of account, if there is any commensurate advantage gained thereby, which may more than counter-balance it. I take this opportunity, however, to bring to your notice, and to the notice of those interested in the subject, the prevalent belief in some parts of this presidency, that de-horning makes the animals more hard-working, and stronger,—capable of enduring greater labor and fatigue, though less *spirited*. I am not aware how far this idea is justified, but if it has any foundation in fact, it deserves to be considered, as adding a more valuable qualification to our draught bullocks, in addition to their incapability to commit mischief by their horns when they are shorn of those appendages, I consider the matters here adverted to, worthy of some consideration.

M. N.

Madras, May 4, 1887.

Editorial Notes.

WE understand that the administration of the Horse-Breeding Operations Department will shortly be transferred from the control of the Military Secretariat of the Government of India to that of the Revenue and Agricultural Secretariat.

WE invite attention to the concluding portion of the paper on 'Wheat Threshing in the Punjab' (reproduced in another column). The suggestions that local bodies might apply for a threshing machine and hire it out at harvest time to prominent landowners, is well worth serious consideration.

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THE report on the state and extent of cultivation on Government and *Inam* lands in the Madras presidency, up to the end of March, 1887, shows that in the first harvest there were 16,918,300 acres under 'dry' and 4,578,670 acres under 'wet' crops; while in the second harvest there were 622,266 acres under 'dry' and 860,238 acres under 'wet' crops, or a grand total of 22,979,464 acres.

We see that the Madras Government has directed the Superintendent of the Government Central Museum to supervise the collection of the silk-producing moths which the district officials have been directed to make throughout that Presidency, for the purpose of perfecting the collection of insects relating to sericulture at the Imperial Museum. The collections are not only to include moths, but caterpillars, cocoons and eggs. The Superintendent is to arrange, report upon,and finally despatch them to the care of Mr. Wood-Mason, in Calcutta.

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The *Englishman* understands that a despatch is going home shortly, recommending to the India Office, for substantial reasons, the retention of the Agricultural Department, Bengal, the formation of which was sanctioned as a temporary measure only some three years ago; and that Mr. M. Finucane, who has steered the Department through its infancy, will continue in the capacity of Director. From this it is quite clear that the authorities duly recognise that "substantial reasons" do exist for the retention of the Department; reasons which the *Englishman* has hitherto failed to comprehend.

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The spring term of the Royal Agricultural College, Cirencester, concluded on the 27th of April last, and among the four students who gained diplomas of membership, we notice the name of Khasherao Bhagavantrao Yadhava, of Baroda Of the two scholarships of £25 and £10, open to the whole college, the latter was won by Syud Mohamed Hadi, of Oudh. Eight students are reported as having obtained the qualifying number of marks for scholarships, and who are "honorably mentioned;" among these the name of Bannerjea occurs. For practical work and cultivation,Banerjea and Sri Lal gained honorary certificates.

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The forecast just issued dealing with the late Indigo sowings in the Madras Presidency, embraces the period from September 1886 to February 1887. The area sown during these six months covered 95,102 acres, giving a percentage of 100. The greater part of the cultivation was confined to the first four months, from September to December. The total area cultivated from April 1886 to February last, was 389,196 acres, against 121,152 acres, in the corresponding period of the previous year; thus shewing an increase of 46-per-cent. Of the total acreage, 76 per-cent consisted of early, and 24-per-cent of late, sowings. The increase is very satisfactory, and denotes that this crop has had an unusually favourable season. The largest indigo-growing districts are Cuddapah, Kurnool and Kistna.

One of the largest consumers of Indian wheat is Italy; in fact, next to the United Kingdom, which took by far the largest quantity of our wheat last year (9¼ million cwts.), comes Italy, which took 5¼ million cwts. The increase of the trade with this country is something phenomenal. In 1884 our exports only amounted to 700,000 cwts., which rose in 1885, to 1¼ millions, and last year the quantity had more than quadrupled. It is thus quite clear that the Italians find Indian wheat most suitable for the manufacture of their national food—maccaroni. The total quantity of wheat exported from this country is estimated at 22½ million cwts., valued at 862 lakhs of rupees; and next to rice, this is the most valuable of our exportable articles. The total exports of rice last year amounted to 26¾ millions cwts., valued at 883 lakhs of rupees; but this shews a falling off, compared with the figures for the previous year, by 1½ million cwts., valued at 41 lakhs of rupees. This decline is attributed to the export duty on rice.

The Horse Show annually held at Rajkot, in Kathiawar, is one of the most important of its kind in India. The Kathiawar breed of horses is well-known throughout the country for its powers of endurance and general physique, and the annual gathering is regarded as an important mart for the purchase of these horses by dealers from other parts of India. We learn that the show held or Rajkot a few weeks back was well attended.The number of animals exhibited being 425,as compared with 309 in the previous year. This number we understand, would probably have been larger had it not been that the Chiefs of Bhavnagar,Palitana and Junagad, who have for a number of years displayed great interest in horse-breeding, kept their mares and young stock at home to show to the Governor, who was shortly to visit them. The quality of the stock shown was good, and in the class of brood mares the first three prizes were taken by private breeders. A useful suggestion, and one which has obtained the approval of the Government of Bombay, was made by Mr. Mackay, that a special class should be formed for remounts.

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The following is the official summary of the reports on the state of the season and prospects of the crops, for the week ending 19th May, 1887:—The rain-fall has been general throughout Madras, Bengal, Burmah, and Assam, and a fair amount of rain has also fallen in parts of Bombay. Elsewhere the week has been practically rainless. *Kharif* operations are in general progress in Bombay, the Central Provinces, and Berar, and have commenced in the North-Western Provinces and Oudh, and the Punjab. Sowings have begun in parts of Bombay and the Punjab. The prospects of the standing crops in Madras and Mysore continue satisfactory; but in Coorg, coffee has been damaged by rain and hail. The early rice is coming up well in Bengal and Assam. Sugarcane is doing wel in Bengal, the North-Western Provinces and Oudh, and the Central Provinces. Indigo is thriving in Bengal and the North-Western Provinces, and Oudh. Cotton picking has been completed in Bombay; and the land is being prepared for the sowing of the crop in Rajpootana. Except in Bengal, where cholera is still prevalent in several districts, the public health is generally satisfactory. Cattle-disease chiefly prevails in Madras and Bombay. Prices show a tendency to rise in the North-Western Provinces and Oudh, and are rising in three districts of the Punjab. Elsewhere they are fairly steady.

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We reproduce in another column the conclusion of the report submitted by the Bombay Forest Commission. Lord Reay is to be congratulated upon the sagacity which prompted the appointment of this Commission. The grievances of the people in this matter of forest produce had reached a dangerous stage, as we pointed out so far back as 1885. That they had substantial grounds for complaint against the over-zealous forest department is admitted by the Commission, and we are glad to see that provision is now made for conceding many of the points claimed by the people, which cannot fail to have a good effect in the future. It is well to remember that the majority of the people who had these grievances are not much removed from savages; moreover, they had been in the enjoyment of many forest privileges from time immemorial, and they very naturally resented any interference with them by the Forest Department. The privileges now conceded to these people in the shape of grazing, firewood, timber, rab, &c., will, we think, meet their case satisfactorily. The members of the Commission have had a very arduous and tedious duty to perform, not unmixed with difficulties and drawbacks; but they have come well out of the ordeal, and are to be congratulated upon the result of their labours.

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The following is a summary of Messrs. Gow, Wilson and Stanton's Indian, Ceylon, and Java Tea Report, dated London, April 29th, 1887:—Since our last (dated 15th instant) 38,618 packages of Indian, 9,897 packages of Ceylon, and 4,012 packages of Java Tea, or a total of 52,527 packages, have been offered in public auction. The better demand for Indian growths induced many holders to place their Teas on the market; the sales have consequently been larger than might have been expected at this season of the year. The offerings comprised a good assortment of very desirable Teas, and competition for these descriptions has been keen, at an advance of fully 3d. to 4d. per pound. The lower grades of useful-liquoring leafy Teas have participated in the advance to the extent of 1d. to 2d. per pound, an

common Souchongs are firmer at ½d. higher rates. As an idea of the current prices of Indian Tea in London, we quote:—

Fannings	5½d.	same time last year	8½d. and	8d. in 1885.
Broken Tea	7d.	„ „	9½d. „	9½d. „
Pek. Soug.	9½d.	„ „	10½d. „	10⅝d. „
Pekoe	11d.	„ „	1/0½ „	1/1 „
Pek. Soug.	7½d.			
Pekoe.	9d.			

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A LARGE increase has taken place in the supplies of Ceylon tea brought to auction, and the sales during the past fortnight have been the heaviest as yet recorded. It is gratifying to note that a good proportion of the offerings shows an improvement in quality. Some gardens have sent home really first-rate invoices, amongst which may be mentioned "Agarsland," average 2-1¼; "Loolcondera," 1-10½; "Elbedde," 1-8¼; "Kirkoswald," 1-6; "Glenalla, 1-4¾. The advance already noted in Indian descriptions has now extended to Ceylon Teas, and there has been a good trade doing at enhanced rates; Pekoe Souchongs being ½d. to 1d. dearer, and Fine Teas fully 1d. to 2d. The 4,921 packages sold during the first week, averaged 1-2, and the 4,976 packages sold during the second week, 1-1¾. The average for the fortnight was 1-1¾ per lb. Of the 4,012 packages Java Tea brought to public auction, all were of direct import, with the exception of 433. The market has remained steady for all descriptions, except the lowest grades of whole-leaf Tea which must be quoted a trifle easier. All Teas possessing quality are in request, and Tippy Pekoes and Broken Pekoes are wanted, especially those with strong or flavory liquors. A fine parcel of "Sinagar" Flowery Pekoe, similar in flavour to Indian Tea, brought 1-11½ per lb., and a handsome Broken Pekoe from "Jasinga," sold at 1-8½. The 4,012 packages sold at an average of 8¾d. per lb.

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THE current number of the *Quarterly Review* contains an interesting paper, by Mr. J. F. Hewitt, on Chota Nagpore, its people and resources, in the course of which he touches upon two important points, *viz.*: (1) An increase in the productive power of the soil, and a diversion of some part of the population to employment in manufactures; and (2), the mineral resources of the country comprised within this division of the Empire. Mr. Hewitt tells us that large areas of fertile soil exist, "now only inhabited by a few wandering Korwas and cattle graziers," where the rayat of Bengal and Behar can, in a dry, healthy climate, raise crops which he understands. These areas are at present practically lying fallow for want of labour to till them, and he thinks emigration to Chota Nagpore should be encouraged. Of the mineral resources, we are told that the country has a practically unbounded supply of coal, favourably situated within easy reach of the projected Nagpore-Bengal Railway. In Mr. Hewitt's opinion this coal is destined, soon or later, to bring salvation to the exhausted soil of Behar, by supplying the rayat with cheap fuel. He throws out practical suggestions for developing the vast mineral resources of Chota Nagpore and founding "the future Sheffield of India" in a locality near Baloonath, in Lohardagga, where "red and brown hematite, magnetite, limestone, and the excellent coal of the south Kurunpoora coal-fields, are all to be found within a few miles of one another"; and he thinks that the attention of the people might with advantage be directed towards engaging in manufactures in a country so favourable to the development of the manufacturing industry.

THE *C. and M. Gazette* does not agree with the writer of the article in the *Pioneer* (reproduced by us a few weeks back) that the primary duty of cantonment lands is to provide fodder for the mounted corps and transport stationed in that cantonment; and that the first duty should rather be to provide grazing for milch cows, and for the slaughter-cattle of the commissariat department, urging as a reason that the "British soldier cannot live on grass, still less can his wife and children. They must have milk, and pure milk, too. Not only Thomas Atkins, but his Sikh brother in arms, must be plentifully provided for in this way, and any measures which interfere with the milk supply, by lessening the grazing area of a cantonment, are a source of danger to the community generally, and the British soldier in particular." Further, our contemporary cannot admit that in cantonments where grass farms are established, they should be provided with land for cultivation rent free; as the cantonment funds would suffer considerably thereby, and any money saved would, instead of being spent upon the cantonment where it accrued, be taken possession of by the examiner of commissariat accounts, and go into the general coffer of the State. Therefore if these grass farms are to be a success, they must be managed by keen men with a liking for the work, determined to make it pay upon an ordinary commercial footing, and without crippling cantonment funds by taking land rent free. These are certainly sound arguments, and cannot fail to commend themselves to business men. So far as the appropriating of rent-free lands are concerned, we are inclined to agree with our contemporary; but we fail to see why both milch cows and slaughter cattle cannot be provided for with forage at the same time with mounted corps and transport animals. We do not think it was intended to mean that every vestige of cantonment land should be appropriated by grass farms, solely for the purpose of supplying the mounted corps and transport animals with good, wholesome fodder.

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THE results of the fish-curing operations in the Madras Presidency during the half-year ending September 30, 1886, as compared with those of the corresponding period of 1885, show an advance in the number of yards worked, from 118 to 137, and in the weight of fish brought to be cured, from 7,837 to 8,794 tons, or an increase of over 12-per-cent. in the quantity of salt-fish turned out. Considering that the period under review was the slack season, and that adverse influences, such as rain and stormy weather, existed in several divisions, these results must be regarded as very satisfactory. The increase in the quantity of fish cured occurred in all the divisions, especially in Chicacole and Tinnevelly, but was hardly appreciable in the Calicut and Masulipatam divisions. In Calicut better results would have been obtained, but for the unfavorable character of the season, which seriously affected operations in the majority of the yards. In Masulipatam, however, the commissioner, on the ground of there being little or no fish to cure, sees but little prospects of the enterprise ever flourishing. The Board of Revenue, however, do not share this opinion, and have directed special investigation, the result of which is to be reported to Government. The success of the Attankarai and Nadupad group of yards, in the Tinnevelly division, was particularly remarkable; the quantity of fish brought to be cured having risen from 5,849 to 15,677 maunds, representing about 50-per-cent. of the operations of the whole division. The average quantity of salt issued for each maund of fish cured, fell from 12·64 to 12·09 lb., while the variations between individual yards continued to decrease. The financial result was a loss to Government of Rs. 2,539 during the half-year, and of Rs. 12,036 from the commencement of operations. But the deficit is not expected to recur, and the enterprise will, it is believed, become a steady source of revenue in the future. Departmental experiments in fish-curing were also conducted in all the divisions on the East coast. So far they are reported to have been satisfactory, although they have nowhere led to any decided results. The commissioner expresses some disappointment at the apathy and indifference with which the fishing classes have treated the efforts of his department in this direction; but the Board of Revenue regards the influence of these operations as sufficiently progressive to be most encouraging.

THE report for the season 1886-87 on the prospects of the Linseed crop in Berar is very discouraging. The area covered during 1886-87, was 386,376 acres, as compared with 618,224 in the previous year. This exhibits a deficiency of 37·5 per cent. This is accounted for by the failure of last season's crop, and to the cultivators having suffered heavy losses. The monsoon rains ceased early, and over a considerable area the seed was sown in ground too dry for proper germination, although the sowings were pushed on earlier than usual. To add to these disadvantages, heavy and unseasonably late rain fell in October when a large area of ground had only just been sown, and the seed not having had time to germinate rotted in the gro[und]

These rains did great injury to these sowings, and a large area was then re-sown with wheat. The estimates of outturn are in some cases very low indeed. Over large tracts the crop was a total failure. In Amraoti, Akola, and Bassein, the damage was less severe, but the outturn is generally a poor one. In short, the linseed crop has been effected in its area and outturn by the character of the season, in much the same way as the wheat crop, but the injury which it sustained from blight was still more severe. The aggregate outturn has been set down at 386,376 maunds, or 13,799 tons, at the rate of one maund per acre. An idea of the shortness of last year's crop may be gathered from the fact that the exports of linseed by rail, between April and December 1886, only amounted to 459,899 maunds, against 997,722 maunds during the corresponding period of the former year. The following figures show the exports during the two preceding years :—

	Maunds.
1884-85	1,402 735
1885-86	1,224,932

It is now calculated that if the estimate of outturn for 1886-87 now submitted, has been correctly arrived at, the amount of linseed which will be available for export during the next 12 months, will show a very considerable decrease over the figures of the two previous years.

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MISS ELEANOR ORMEROD, consulting entomologist to the Royal Agricultural Society of England, has addressed the following letter to one of our English exchanges, on the subject of the damage and loss sustained by farmers by the warble maggot in cattle:—

Now that the season has arrived at which warble maggots can easily be dealt with, will you permit me to draw the attention of your readers to the great importance of getting rid of them both for the sake of the cattle now, and also to prevent summer attacks of the fly. The loss of flesh caused to fattening beasts, and on milk and produce of dairy cows, by not putting a stop to the summer galloping, has been so strongly brought forward by many of our leading cattle owners during the last few years, as well as other points in which warble attack involves serious loss, that it is unnecessary to recur to this. Also the observation of some years (extended over the United Kingdom) have shown that where warble maggots are destroyed in spring, that on that farm there is freedom from attack to any appreciable extent of fly in summer, and consequently from maggots in the following spring. Under these circumstances, and looking to the desirableness of clearing the pest out of the country, I have been receiving urgent applications from many quarters to assist so far as in me lies, in drawing attention now to the subject and accordingly have prepared a *Note* on the subject for general distribution, and shall be happy to forward copies to all who may aid in *stamping out* this wasteful and unnecessary pest. I am happy to say that the subject is receiving most careful attention in many places. The Butchers' Trade and Benevolent Association, under the president, Mr. J. H. Rodway is now placing itself in communication with the other Butchers' Associations, and the Chambers of Agriculture throughout the country, relatively, to the desirableness as well as the possibility of exterminating the pest. We are drawing attention in various districts not only to the well-known points of loss caused by the attack, but also to the damage to the health of the attacked animal, which may be better demonstrated by display of the newly flayed hide of a badly infested beast with the great thick maggots an inch long moving in their putrid cells (and the concomitants unnecessary to enter on) than by mere survey of the coat of the living animal. A large number of a fully-illustrated *Note* (in which a short account of the attack is given together with simple and proved means of prevention)are now ready and many are already being distributed. It would give me pleasure to offer these copies of my reports which give the subject at greater length wherever they might be of service, and especially in quarter hundreds, or larger numbers, to centres for distribution, or to reply to any inquiries on the subject.

The 'Note' referred to will be found in another column. We believe a near relative of the warble fly and maggot, exists in this country, as we have often found it embedded in the skin of cattle; we should, however, like to have some further information on the subject.

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THE report for the season 1886-87 on the prospects of the wheat crop in Berar is decidedly favourable. The total area under wheat is shown to be 932,938 acres, against an assumed normal area of 807,305 acres, or an increase of 15 per cent. The estimates are, however right in representing the crop over a considerable area of the Province to have been very far from a good one. A considerable area of linseed was sown much earlier than usual. With the commencement of October, however, rainy weather set in, and in some places exceptionally heavy falls occurred. This secured the prospects of the *rabi* sowings, but did an immense amount of damage to the area on which linseed had been previously sown. A large proportion of this area was then ploughed up and re-sown with wheat. This occasioned a considerable waste of seed grain. But the fresh sowings were made under far more favourable conditions and this late rain also enabled the people to sow a large amount of land with wheat which would otherwise have remained fallow. On the other hand, the rainfall of the ordinary monsoon season had been over a large area of the Province so short, that the wheat crop suffered from lack of moisture, and in some places, principally in the Booldana district, the severe and exceptional cold which followed the late rains induced an attack of rust which did considerable damage. The gross outturn for the province is put at 3,735,752 maunds, calculated as was done last year by taking the average outturn per acre at 4 maunds The estimate of last seasons production amounted to 3,234,060 maunds; this year's outturn is represented to be 15 per cent more than that of last year. The outturn was largest in Amraoti and the adjoining district of Ellichpore, where the outturn was on the area sown above the average. It reached the average in the Akola and Buldana districts, but over the remainder of the province fell rather short of it. In one district the deficiency is shown to be as low as 4-annas in the rupee. The total exports for 1885-86 amounted to 1,221,009 maunds, as compared with 551,861 maunds in the preceding year. These figures show the position which the Hyderabad Assigned Districts are gradually attaining amongst the wheat producing tracts in India ; but doubtless all exported wheat is not grown in Berar alone, but makes use of our excellent means of communication to reach the railway line. During the nine months ending December 1886, exports amounted to 1,637,598 maunds. The average prices which ruled for wheat during each quarter in the markets of Amraoti and Akola are shown below

	Price per maund of 80 pounds.					
	Amraoti.			Akola.		
	Rs.	A.	P.	Rs.	A.	P.
Ending 30th June 1886 ...	2	4	6	2	1	8
Do. 30th September 1886 ...	2	6	0	2	8	0
Do 31st December 1886 ...	2	3	6	2	0	0
Do. 31st March 1887 ...	2	10	7	2	8	0

The figures are derived from fortnightly returns furnished by Deputy Commissioners, showing the prices current for certain important trade staples on the first and fifteenth days of each month. Under the orders of Government some general information is to be given in these reports regarding the prospects of food crops other than those to which the forecasts relate. Over the whole province *jowari* is the staple food-crop ; and though in some places this suffered from the scantiness of the monsoon rain, speaking generally, a very fair crop was gathered.

WHEAT-GROWING COMPETITION OF THE WORLD.

THE current number of the *Quarterly Review* contains a very interesting article on competition in wheat-growing between the various countries where this cereal is cultivated on an extensive scale The article is based upon statistical reports of America, Russia, India, Australia, Canada, Chili, &c. The subject is one of considerable importance to this country, especially from the point of view taken by the writer of the article referred to. He tells us that the wheat acreage of the world had been increasing enormously for several years up to 1880, and less uniformly up to 1883. During the ten years ending 1880, the acreage had doubled in the United States, *i.e.*, it rose from 19 to 38 millions; while in Australia it increased two millions in the ten years up to 1884. The increase in India, the writer calculates to have been one-fourth since 1874 and in Chili no progress has been made since 1871.

When we consider that the wheat area in the United Kingdom has decreased by about 25 per-cent since 1876, and that the cause of this falling off is chiefly due to the very low prices prevailing, we can understand the anxiety of the writer to enquire into the matter. America has long since ceased to export her wheat at a profit at present prices; the area under cultivation has already been considerably curtailed, and this process must continue until prices rise. Add to this, the increased home consumption in the United States, due to increase of population. These causes combined, the writer thinks, will soon decrease the surplus available for export, and the United States will, in the space of five years, be unable to export any of its wheat. The conclusion the writer comes to, from a survey of the conditions of agriculture and the cost of production in England, is that even allowing for the progressive removal of various burdens on the land, there is no reason to expect the restoration of the wheat acreage of 1876, and still less that of 1866, unless the price recovers so as to lie somewhere between 40*s*. and 45*s*. per quarter in England. And that in all parts of the world, with one "doubtful exception," wheat-growers have been partly or wholly ruined by the long period of low prices, and British growers have only suffered with the rest. So that the wheat-growing area of the world has already begun to contract, and will continue to be seriously diminished, unless the average prices is at least 40*s*. a quarter in England. He thinks that this diminishing production, accompanied with an increasing demand, will send the price up once more to a point where cultivation becomes remunerative. Whether that time will ever come, and the English farmer be able to grow wheat at a profit, is a question which cannot at present be answered with any degree of satisfaction. If we take into consideration, however, the fact that neither the United States, Canada, nor Australia can send wheat to England profitably at a price under 40*s*. a quarter, exportation from those countries must continue to decrease, and thus in time a chance may offer itself to English farmers to cultivate at a profit once more.

There, of course, remains India, which the writer in the *Quarterly* regards as a "doubtful exception" to the wheat-growing countries which have suffered by the low prices. Now, we fail to see how India can be regarded as a 'doubtful' exception. It appears to be quite clear that India *is* the only exception; and for this reason: If the Indian ryot can grow wheat profitably at a price so much lower than the American, Canadian, or Australasian farmer, as to land his grain in London, and there sell it at 30*s*. a quarter, it follows as a matter of course, that he will drive his rivals out of the field. The only question for consideration is, whether it is to his interest to monopolise the whole wheat supply in London at a very low price, rather than supply a large proportion of the demand at very much higher prices. The writer in the *Quarterly* seems to think that it is the *low exchange* that has enabled the Indian cultivator to undersell all other countries in the matter of wheat, and that until such time as silver recovers itself, the wheat trade of India will continue to expand; and this he regards as an unhealthy stimulus—an expansion obtained at the cost of the country's financial credit, and the steady advance of her trade interests as a whole. Now, it has been pointed out in these columns times out of number, that it is not the low *exchange* but the low *price* that gives India the command of the London wheat market. Fifteen years ago it would have been almost impossible for India to have competed successfully with the United States in the wheat supply of the English market. It is the opening out of railways, by which some of the richest wheat-growing tracts have been tapped, and the lowering of freights generally, that have enabled her to do this. It follows, therefore, that whether exchange had fallen or not, a considerable expansion of India's wheat trade would have taken place. No doubt low exchange has had *something* to do with the extraordinary development that has taken place within the last few years, but we are inclined to regard the two events as co-incidental.

The article in the *Quarterly Review* is written manifestly in the interests of the English farmer, the object in view being doubtless to show the depressed state of the trade generally. Wheat as an article of export is, next to rice, the most valuable to India; as an article of consumption, it is the most valuable to the United Kingdom, So that practically, wheat may be said to rule all other markets. If India can supply all the wants of England, and a large proportion of the wants of other European countries in this respect, there is no reason why she should not rule all the markets of the world. We have no doubt whatever that Indian wheat would drive out all others from the markets of Europe were more attention given by shippers at Calcutta and Bombay to cleanliness of grain. This fact impresses us more and more every day, and we cannot help thinking that the Bengal and Bombay Chambers of Commerce would do well to take some steps to 'improve the shining hour' by making an alteration in the existing system of 'refraction'—so far as it relates to wheat at any rate—and thus secure now a monopoly of the supply to the United Kingdom at least. Italy already takes a little more than half the quantity of Indian wheat imported into the United Kingdom, and next to it, is by far the largest consumer. Most European countries cannot raise sufficient wheat for their home consumption; and in a few years there is little doubt that it will become impossible to raise the grain at a figure sufficient to cover the cost of production, and they must then go to other markets. Now what other country is better situated, or able, to meet this demand than India? It therefore becomes a matter of national importance that our great export firms should endeavour to secure this monopoly by exercising care and discrimination in selecting the grain for export to foreign markets. And the first step towards this end, in our opinion, is the abolition of the mischievous refraction system.

Miscellaneous Items.

A SERIOUS fire has broken out in the forest fifteen miles from Murree, and ten thousand acres have already been burnt down. The fire is still raging, and, if the wind changes, Murree itself may be in danger.

ADVICES from Behar continue satisfactory regarding the indigo prospects, and the plant is said to be everywhere looking healthy, some rain being all that is wanted to secure a full crop. One or two factories in Champarun and the south of Tirhoot have had slight showers of rain, but more would be acceptable. Some rain has also fallen in the Bhagulpore, Jessore, and Midnapore districts, which has improved the prospects there, but throughout the rest of Bengal the reports are not so satisfactory, and in several places the plant is reported to be suffering considerably from drought. The accounts from Benares and the North-West *Provinces* are, on the whole, favourable.

ONE of our exchanges writes that although a large proportion of the commercial cocaine and its salts is obtained from South American crude cocaine, which is purified by European manufacturers, we have, until now, preferred to use cocaine made directly from the leaf. But as the manufacture of the latter no longer pays at the present prices, we shall gradually have to fall back upon the employment of the crude product. At present the commercial value of the alkaloid is still high enough to encourage experiments for substitutes, and, among others, Professor Filehne's researches in this respect have yielded very interesting results, showing that benzoyltropin has highly pronounced local anæsthetical effects, but acts on the eye too much like atropine, apart from the fact that it is too expensive to form a useful substitute. But the discovery of a method of making cocaine synthetically is quite within the range of possibility, especially as in its composition the alkaloid is so nearly analogous to the benzoyl derivatives.

A SUBSTANCE known as "Gum chicle" is largely used in America for various purpose. As the gum is not widely known, one of our English exchanges describes it as a gummy, resinous substance found around the seeds of *Sapota Achras*, a sapotaceous tree growing abundantly in the warm and damp regions of Mexico. The local name for the plant is chiccosapote. Chicle is of a whitish colour, and is easily softened and rendered plastic when placed in warm water. Its chief uses are for modelling purposes, and as a masticatory; for admixture with india-rubber for insulating electrical conductors (as cables and

telephone wires), although, as it is somewhat more brittle than rubber it is not considered very suitable for this purpose, since it is said to make the rubber less flexible. It has also been suggested as a paint for ship bottoms. Amongst its synonyms may be named "Mexican glue," and "rubber juice." It is not a true gum, nor a resin. It is imported into New York from Mexico in large quantities.

The Kew *Bulletins* for February, March and April, 1887 have a few interesting papers in them. The number for February contains an interesting note on Cape box-wood (*Buxus Macowani*) by Mr. J. R. Jackson. Since his previous inquiries Mr. Jackson has obtained further information and better samples of the wood, and the conclusion arrived at is that the wood is not a suitable one for wood engraving, as was at first hoped. One satisfactory outcome of the inquiry is the undoubted proof that the tree which yields this wood is a species distinct from *Buxus sempervirens*. In the same number is published a correspondence between the Colonial Office and Kew in regard to industries at Mauritius. There is little in this correspondence of direct interest to the pharmacist. Mr. Thistleton Dyer hints at the cultivation of sandal wood and spices, such as cloves, and considers that more attention ought undoubtedly to be paid to cinchona, as to which there appears to be no physical difficulties; but apart from that he seems to think that the Mauritius Government would save money by making their own quinine. In regard to this Mr. Dyer's colleague (Mr D. Morris) is of a different opinion. He believes that the cultivation of the different species, except, perhaps, red bark to a limited extent, and possibly cuprea-bark trees, is not likely to be a success. This opinion is based upon later information than was available, apparently, to Mr. Dyer, and, we should judge, is influenced by the writer's experience in Jamaica. The March and April numbers of the *Bulletins* are devoted to various fibre-yielding plants, and they convey interest and useful information. We are glad to notice that the phrase, "All rights reserved," has been removed from these publications. It would be a further improvement if the pagination ran on throughout the year's numbers, instead of being fresh each month.

The following interesting information regarding the adulteration olive oil, is furnished by the British Consul at Leghorn, who says:—
[Th]e exportation of adulterated oil, in what are commonly known as Florence flasks, continues, and has, indeed, received a fresh development. Whereas formerly the practice of certain firms was to put in these flasks the lowest quality of olive oil (not produced in Tuscany, but coming from other districts such as the Romagna) mixed with cotton-seed oil; of late the cotton-seed oil, pure and simple, has been sent, the cases being branded 'olive oil' of superlative quality. But as cotton-seed oil is to be had cheaper in England than in Italy, things have culminated logically enough, in exporting the empty flasks, packed in the usual cases, to London, there to be filled with cotton-seed oil; and of course palmed off upon the public as olive oil of fine quality. The reason for this state of things is not far to seek. At one time really pure and good olive oil was exported in these flasks; but over competition, and beating down of prices by importers in England—who, be it said, care nothing about quality and insist only on low prices— led at first to inferior olive oil being substituted, and next, to adulteration with cotton-seed oil, not to mention short measure in the flasks. Neither the flasks nor the cases in which they are packed have at any time borne the brand of the exporter, this not being allowed by the importers, as prejudicial to their particular interests; hence it followed that the best firms in the Leghorn export trade have stood exactly on the same level with the English public as the firms who resort to the practices described above, both being alike unknown to the English consumer. The result is now apparent. The Florence flask trade—a speciality of Leghorn, these flasks not being procurable out of Tuscany—is utterly discredited, and has been totally abandoned by the leading firms engaged in the export trade in olive oil, who refuse to lend themselves to such discreditable practices. Therefore persons buying oil in Florence flasks *may* know what to expect now. It is not an easy matter to get the genuine Lucca oil of fine quality in England; the demand is chiefly for cheap oil, the ignorance of the public being traded upon to a great extent. If the public wish to get Tuscany or Lucca oil, as it is generally termed pure and of the best quality, they must look to the standing and reputation of the firm by whom the oil has been imported and bottled, and whose brand can be considered a sufficient guarantee; since, unfortunately, the leading firms in the export trade from Tuscany are unknown to the public in England. Failing these precautions they will probably get rubbish."

Selections.

REPORT OF THE BOMBAY FOREST COMMISSION.

(*Conclusion.*)

In the preceding chapters we have reviewed the general evidence and stated our opinion as to the best way of settling such question of importance. The task has necessarily been laborious owing to the number and variety of the complaints and the great mass of evidence to be weighed. If any apology is due for the length of this report it must be remembered that the grievances we have had to inquire into do not refer merely to single recent acts restricting this or that local privilege, but to the whole policy of Government as regards trees and the user of forest and waste lands, as pursued for a great number of years past. The complaints are not limited, as might be supposed, to the administration of the forest under the comparatively recent Act of 1878. Some complaints date as far back as the year 1839 when the prohibition against cutting teak in forest lands was first issued, or it may be, re-affirmed. It has been necessary, therefore, in order to judge of the merits of many of the claims and grievances brought forward, to review the forest administration of the North Konkan districts, so far as it affects each particular claim, from the earliest period of which any record is forthcoming down to the present day. The separate treatment of different subjects which are more or less intimately connected one with the other, has also involved much repetition which, for the sake of clearness, we have found unavoidable. We will not prolong our report unnecessarily by again repeating in detail our conclusions on each seperate issue. As however our recommendations are scattered through many pages of the preceding chapters, it is desirable that we should state in a few words the leading principles on which our proposals are based, and give a brief summary of the different measures we consider necessary for the satisfactory settlement of the popular grievances.

2. The evidence shows clearly that the inhabitants of the North Konkan have from the earliest times supplied themselves from the nearest forests and waste lands, with all the common timber, firewood, and other forest produce they have required for *bonâ fide* domestic and agricultural purposes. The necessity of protecting valuable forests from reckless destruction has been realised and asserted by the British Government for the last half-century or more. But the restrictions imposed from time to time in the earlier years of forest administration were intended mainly to check the exhaustion of forest resources by indiscriminate cutting for the export trade, and had little or no effect on the exercise of purely local privileges. No really *effective* measures to regulate or restrict this ancient user of the local agricultural population can be said to have been taken until after the passing of the Forest Act. But the setting aside of certain defined areas as village forests, or 2nd class reserves, between 1863 and 1878, for the exercise of local forest privileges, was a step in this direction, as well as an acknowledgment by Government of the necessity of making special provision for local wants.

3. We hold that former custom, and the conditions of agriculture in the North Konkan give the cultivators of this tract a strong and a special claim to liberal treatment in respect of all arrangements for the supply and distribution of forest produce. The justification for the claims of the people to be supplied with materials from the forest, on favoured terms, for home and field u[se] rests on the fact clearly established by the evidence, that the supplies available from sources other than the existing fores[ts] are [in]sufficient to meet their wants. This result is due [to] a great me[as]ure to the distribution of the available waste or B[ara]k[a]s area between private holdings, communal pasture lands and for[est] a[s] effected at the survey. It has been shown very clearly that much of the tree-covered area used by the people as a source of *rab* supply was not allotted to the *de facto* occupants at the survey, but included in the communal waste area. No immediate inconvenience arose from this distribution for there was no actual interruption of the former user of the waste lands. The private forest resources of the cultivators were in fact supplemented from the general forests and waste area to the full extent of the local demand. The user of such portions of the waste and forest area as were set apart as common pasture lands and village reserves, was moreover from time to time expressly authorized.

4. So long as the people could satisfy all their legitimate wants from these communal lands they had no reasonable grounds of complaint. Up to 1882 the guiding principle of all demarcations of forests in the North Konkan had been to effect a complete separation of the forest areas required to meet the local demand, from those to be set apart as Imperial reserves under the strictest possible conservancy. Under the new departure taken in 1882 local supply ceased to be a factor in the demarcation of forests. It was thought that local wants could be better met in future by ignoring the previous distinction between village and Imperial reserves, and working the entire forest area under one uniform system. Thus all hill ranges and large forest blocks were to be made reserved forests under the new Act, and only such isolated hill lands as were of sufficient size to come conveniently within the limits of a forest beat were to be retained as protected forests. The natural result of the application of these principles has been that large areas of *gorch·ran* and village reserve, on which the forest villagers had previously depended to a great extent for their supplies of wood, for fuel and farm implements, and of tree loppings for *rab*, were incorporated in the reserved forests. The stricter regulations for the protection of these areas, which have been introduced as a consequence of the general forest policy of recent years have, as we have shown in the preceding chapters, greatly curtailed the privilege formerly enjoyed by the people in these areas.

5. The legal competency of the State, as proprietor of all waste lands, to assign such areas for any purposes it may deem

necessary in the public interest, and to regulate the exercise of all privileges therein at its discretion, admits of no doubts, as a general proposition. But the exercise of this right imposes a corresponding obligation to take due care that any action thus taken does not cause hardship or undue inconvenience to vested local interests. We fully recognise the fact that local conditions may in the more thickly populated Konkan *talookas* make it expedient to place under forest management and conservancy much of the area formerly assigned for communal pasture and the supply of local forest wants. A complete separation of local from Imperial forests may, as we have stated, be possible and desirable in the wilder parts of the country where local wants are limited and forest resources ample. But such separation cannot be effected in other localities without sacrificing all effective gaurantees for the permanency of the supply. In such cases the local residents can have no just grounds of complaint if reasonable provision for their wants is made in the general forest area. In the recent settlements however, the fact ap-ears to have been overlooked that the reserved forest, as con-[illegible]ed in the settled *ta ookas*, contain virtually all or nearly all the areas which were formerly assigned for the supply of local wants. The privileges now allowed in the reserved and protected forests, respectively, of the settled *talookas* are indeed such as would have been suitable and proper, had these forests corresponded in any degree with the former divisions of forest land into Imperial and village reserves. But in settling these privileges due account has not, in our opinion been taken of the very different principles under which these recent demarcations have been effected.

6 While however we advocate a liberal settlement of the claims of all classes of the local population, we cannot admit any claims to be reasonable, the exercise of which is inconsistent with the necessity, which is fully admitted by the memorialists themselves, of so regulating the use of the forest as to provide reasonable and effective safeguards against the exhaustion of the supply. It is also manifestly right that the local demand should in the first instance, be met as far as possible from the produce of the lands already in the occupation of the people under different tenures, and from the communal waste lands excluded from forests. The State forests cannot be fairly laid under contribution for this purpose until all other available resources have been fully utilized.

7. Applying these principles, we have recommended the most liberal arrangements for meeting the grazing requirement of cultivators, and the local demand for forest produce of all kinds for *bona fide* home and field use. We have also urged the expediency of liberal rules for free grants of wood, both for public purposes and to meeting exceptional cases of distress.

8. In the absence of any reliable data as to the total *rab* demand of the forest villages, and the supply now available, or which can in future be made available, from sources other than existing forests, we have been unable to suggest any *permanent* arrangements for meeting the wants of cultivators who have no private *shindad* lands at all, or insufficient lands of this description, in proportion to their rice cultivation. We have therefore, proposed that as a temporary concession for the next ten years, the cultivators of forest villages shall be allowed to lop certain specified trees in the open compartments of the reserved forests. This concession will prevent any immediate inconvenience, and will cause little appreciable injury to the forests. The trees in the areas laid under contribution for *rab* in years past are admittedly valuless as timber. When any compartment has been clean felled, the fresh growth will of course be protected by closure.

After the period named has elapsed it will be desirable to review the whole question again by the light of the further experience and information collected in the interval. Those occupants who have suitable *shindad* lands already can then be fairly thrown entirely on their own resources. But some further provision will be necessary for occupants who have no such lands. How such provision can best be made is a question which can be better decided, when the general effects of the measures we have proposed for the preservation of the tree growth in occupied lands have been seen, and when better information is available as to the extent to which the waste lands excluded from forests can be relied on for purposes of *rab* supply.

9. To ensure the co-operation of the people in forest conservancy the most liberal regulations in all matter connected with local supply are esstentially necessary. We are confident that the measures detailed in Chapter IV, while making ample provision for all reasonable local wants, and giving the general population a more direct interest in the preservation of the forests than they now have can be carried out without any real injury to forest conservancy and without the loss of any legitimate forest revenue.

10. As a safeguard against the abuse of local privileges by the sale to traders of produce obtained from the forests at free or favoured rates, and the subsequent passing off of such materials as the produce of occupied lands, we have strongly urged (*vide* chapter viii), as a vital condition of the introduction of the various measures proposed, the amendment of section 41 of the Forest Act, in order to legalize the control in transit, of all tree produce, whether obtained from forests or private holdings.

11 We have also proposed to make the continuance of forest privileges to individual occupants of *barkas* lands dependent on the discretion they may exercise with regard to the disposal of the tree produce of occupied lands containing trees, in which they have acquired full proprietary rights The present forest difficulties are due to a large extent to the improvident destruction of the unreserved tree growth in occupied lands, which was surrendered unconditionally to occupants at the survey in all the North Konkan *talookas*, except Sanjan and Colvan. Government may not be able to resume the control over the cutting of trees so parted with. They may, however, fairly presume that the wants of occupants who cut their trees for the export trade are already fully provided for, and that they have no reasonable claim to replace the material so sold in the best market by supplies obtained from the forests at free or favoured rates. So long as a cultivator abstains from trading in the trees in his land, and utilises them solely for domestic and agricultural purposes, or for *local* sale only, it is unnecessary and undesirable to place him under any limitation as to the exercise of any forest privileges he would ordinarily enjoy. But if he exports, or sells for export, the tree produce of his holding he may fairly be considered a trader in wood and not a privileged cultivator.

12. As a measure of conciliation and general good policy we have recommended (*vide* Chapter vi) a liberal settlement of the claims of the people as regards all trees, the right to which has been reserved by Government in occupied lands. Our object is to encourage in every possible way the preservation of trees in the *barkas* and *shindad* lands allotted to cultivators, as a permanent source of *rab* supply, and to discourage and prevent by all possible means the reckless clearing of such lands for export trade purposes. There is little hope of occupants guarding and preserving the trees in their lands however, *until the full use and enjoyment of the trees for all domestic and agricultural wants is unequivocally guaranteed to them*. All *bona fide* cultivators will, we believe, cheerfully submit to any restrictions ensuring that the tree produce of occupied lands shall be utilised exclusively to meet local, as distinguished from trade, demands, *provided they clearly understand that such restrictions are imposed solely in their own interests, and that Government will in no case take advantage of such reservations for revenue purposes.*

13. We have advised accordingly that throughout the Thana district all the royalty trees in which the proprietary rights still vests in Government should be made over to occupants, with or without payment, as the case may be, subject to the conditions : (1). That the wood of such trees shall not be exported or sold for export, and(2), that if the land on which the trees grow has been uncultivated for ten years or more, it shall not be cleared for cultivation but shall be kept as permanent *shindad* land, In consideration of these conditions we have recommended that the price to be charged for teak and other royalty trees shall not exceed half the market value, and that three-fourths of the assessment on lands permanently set aside as *rab* reserves shall be remitted. We have further proposed that the jungle-wood trees in the occupied lands of Kolvan and Sanjan, the right in which was reserved by Government at the settlement of those *talookas*, shall be handed over to occupants on the same conditions, but without payment.

14 The special circumstances of the Colaba district and the action already taken there as regards the disposal of the reserved trees, make it inexpedient to burden the sale of the few trees still owned by Government in that district with a condition against export. But although no such condition can now be imposed, it is nevertheless important that the reckless cutting of trees for trade purpose should be checked in that district by judicious executive action, and by making the forest privileges of individual occupants dependent on the discretion they may exercise in that respect.

15. As a further inducement to the cultivators of both districts to set aside suitable lands for *rab* plantations, we have proposed that three-fourths of the assessment shall be remitted in the case of any *barkas* lands which occupants may *voluntarily* agree, at any time during the settlement, to devote to this purpose, subject to the same conditions as regards export.

16. In Chapter VII. we have proposed an equitable settlement of the claims of the Thana people to the fruit trees planted or preserved by them according to former custom in waste lands.

17. In Chapter V. we have dealt with the claims of the wild tribes, and have stated our conclusions that it is undesirable to perpetuate or accentuate the present distinction between them and other depressed labouring classes by special tribal privileges or indulgences. Their present circumstances are such as to make it expedient that they should be given as far as practicable the monopoly of all labour entailed by departmental forest operations. It will be well also to continue the privilege they now enjoy of taking inferior wood from the forests for the construction and repair of their huts. But in respect of forest privileges generally, we think, for the reasons stated, that it is undesirable to treat them as a peculiar people. They will share, under the proposals made in the different sections of our chapter dealing with local supply, all the privileges granted to the residents of forest villages These privileges are, we think, sufficiently liberal to prevent any of the poorer dwellers in the forests from becoming a source of anxiety in the future. We do not consider it necessary to give the wild tribes a *monopoly* of the local sale of head-loads of firewood and minor forest produce. All classes who are mainly dependant for their living on the wages they earn by collecting and distributing forest produce should be allowed the same privileges, if they choose to avail themselves of them. It may fairly be assumed that no one will resort to this mode of life unless compelled to do so by necessity. The prevention of all irregular exploitation of the forests for timber and firewood, and the limitation of free headloads of the latter material to the small branch wood available from the forest fellings will be sufficient safeguards against the abuses of the privileges recommended.

18. The privileges which we think should be conceded to the residents and cultivators of forest villages, including the wild tribes, have been detailed in the various sections of our report, dealing with local supply. It will be useful however, to recapitulate them here. They are intended to meet the wants and convenience of the well-to-do classes, as well as those who are chiefly dependant on the forests for their living The provisions as regards the supply of timber and superior firewood will naturally be superfluous in the case of the latter :—

Grazing.

(1). They may graze their cattle free in the unclosed portions of the forests (paragraph 56 of Section 1, of Chapter IV,)

Firewood.

(2). They may, in common with all poor inhabitants of the district, remove by head-loads, free of payment, for barter, sale or

consumption, all branch or small wood of two inches and less in diameter from the special annual cuttings for local supply. They may remove the better class of firewood from the same *caupes* by carts on the payment of a fee of 8 annas per cart.

Timber.

(3) They may purchase wood for building and agricultural purposes from the same *caupes* either at the rates fixed for the supply of forest villagers, or at the periodical petty auctions.

Bamboos.

(4). They may take bamboos for their *bonâ fide* personal requirements from the enclosed portion of the forest, without payment and without any description of passes, provided the bamboos are not transported beyond the limits of the forest block, or the village in which they reside or hold lands.

Rab.

(5). They may, as a temporary privilege and until further orders, make up the deficiency of their *rab* supply by taking loppings of certain specified kinds of trees from the unclosed portions of the forest (*vide* Chapter III, Section 3, paraph 59), in addition to the privilege they already enjoy of removing grass reeds, leaves, shrubs, and brushwood from the same areas. They may also remove grass from the closed portions of the forests.

Minor Forest Produce.

(6). At present *hirda* and *beheda* nuts, and *mowra* flowers, should be considered as strictly reserved. Excepting these, they may collect free of charge, for use, barter, or sale, all unreserved and unfarmed minor produce, such as fruits, leaves, bark, herbs and roots, for medicinal or religious purposes.

(7). They may also collect for *bonâ fide* personal consumption such articles of minor forest produce as may have been farmed, but not strictly reserved.

Karvi.

(8). They may cut and remove *Karvi* free of charge from the unclosed portion of the forest for domestic and agricultural use, and also by headloads, for sale beyond the limits of the villages in which they reside.

Thorns.

(9). They may remove thorns from the unclosed portions of the forest for *bonâ fide* domestic and agricultural use,

Earth and Stones.

(10). They may take earth and stones, free of charge, for purely agricultural purposes from the unclosed portions of the forests.

19 It will be observed that in dealing with forest privileges of all kinds we have made no distinction between reserved and protected forests. We are very strongly of opinion that the same privileges should be allowed in all *open* compartments of the forests, whether protected or reserved. All rules as regards the exercise of local privileges should obviously be as simple and intelligible to the people as possible. Different sets of rules for different classes of forest will cause much unnecessary confusion. Under the system of demarcation adopted in the settled *talookas* of Kalyan, Bassien, Bhivandi, Karjat, Salsette, Alibag, Panvel, &c., the *raisan d'etre* for protected forests is not apparent. The areas which have been constituted forests of this class, consist, we understand, of comparatively small and isolated hill lands. Bare and denuded lands of this description have, as a rule been excluded from forests, while similar lands containing valuable tree-growth have been made protected forests. It has been deemed advisable to grant more liberal privileges in the protected than in the reserved forests. Had these protected forests been expressly selected with reference to their area, situation, and resources, as a provision for local wants, or had they been made protected forests as a temporary measure only, with the view of eventually dis-foresting them, when required for extension of cultivation, there might be excellent reason for working them under a different system from the reserved or Imperial forests. As however their selection in the *talookas* already settled appears to have been determined by other considerations, we can see no reason for making any distinction between them and the reserved forests as regards the exercise of local privileges. All the protected forest blocks in the settled *talookas* except those of the Matheran plateau, which have been made protected forests for special reasons should, we think be made reserved forests if they are likely to repay systematic conservancy. Those that will not do so had better be dis-forested the exercise of privileges therein being regulated by rules under the Land RevenueCode This course, however, will involve a further inspection of the lands by the demarcation officers, and further proceedings under the Forest Act. Should this be thought undesirable or inconvenient we see no objection to the areas in question being retained nominally as protected forests, *provided the rules for their management are identical with those for the reserved forests.* We would suggest also that it would be well for Government to publish all the privileges conceded in the forests of either description in the form of rules, under Section 75 of the Forest Act.

20. We have divided our report for the sake of clearness and convenience into as many chapters as there appeared to be subjects of sufficient importance to be separately considered. We have, we believe, covered in this way the whole range of the popular complaints Each subject separately discussed has however a very intimate bearing on all the rest. Our proposals for the settlement of each question, though separately described in the report, are but links in one connected chain, and component parts of what we trust will be considered and accepted as one homogenous scheme. All our recommendations are made in this hope and understanding. Minor alterations in the details of the proposed settlements may of course be found necessary. But the rejection of the leading principles of any one portion will in our opinion destroy or impair the efficiency of the remaining parts.

21. The success or failure of the measures we have advocated must necessarily depend in a great degree on the spirit in which they are carried out by the local revenue and forest officers of all grades. Sympathy with local wants and tolerance of local prejudices must be shown, as well as firmness and preseverance in enforcing necessary regulations. Above all things the finality of the system adopted for the local supply of timber and firewood must be recognised by all concerned. It must be clearly understood that Government, while showing the utmost consideration possible for the wants and customs of the people and making every endeavour to place within the reach of all classes of local residents, according to their means and convenience a sufficient supply of the wood they need for home and field use, will in future deal with a strong hand with any *systematic* and *deliberate* attempts to evade or defy regulations, which are deemed absolutely necessary in the interests of the public at large.

22. In their Resolution No. 2206, of the 26th April, 1880, Government have clearly and wisely laid down the principles which should guide forest officers in instituting prosecutions for forest offences:—

"The Honourable the Governor in Council would impress upon the officers of the Forest Department the absolute necessity for the exercise of the greatest care and forbearance in the institution of prosecutions under the Forest Act. Criminal charges under the Act should only be preferred after warnings have been disregarded, and in cases where no resonable doubts can exist that the offender has intentionally and knowingly transgressed the provisions of the Act, and has not merely ignorantly acted in accordance with previous custom, or in pursuance of a right which he in good faith believed that he possessed."

In a subsequent Resolution, No. 5730, of the 28th October, 1880, Government have again referred to this subject in the following words:—

"It is in the opinion of his Excellency the Governor in Council most undesirable, that ignorant villagers should be prosecuted in the criminal courts for taking from the Government forests a few twigs or small branches, or a little brushwood of in appreciable value. In no instance, at all events, should a person be prosecuted for a first offence of so exceedingly trivial a nature. A mere warning on the part of the forest officer would suffice. But if after being detected and warned once or twice the same person is again discovered cutting Government trees, the circumstances of the case would be altered, and wilful and repeated infractions of the law may form a suitable and proper ground for criminal prosecutions As far as possible, however, such prosecutions should be avoided and recourse should only be had to them when real injury is being caused to the Government forests, and when there is good reason to believe that the offender is deliberately and of set purpose transgressing the law."

23. These principles cannot be too often or too strongly impressed on the minds of all concerned. Nor again should the clear declaration of policy contained in Government Resolution No. 6144, of the 1st November, 1875, be forgotten. "In striving to obtain these ends" (i.e the preservation of timber from wasteful destruction and the realisation of the revenue fairly to be expected from the forest) "Government are bound to pay due regard to the habits and wants of perhaps the poorest class of the population, and they strongly deprecate vexatious and oppressive interference with their daily life for the purpose of enforcing in details the so called rights of the Forest Department." The history of the forest management of the Thana district from 1882 to 1885 has convinced us that the principles above laid down have not always been uniformly adhered to in actual practice. The forest regulations have been in many cases we think, unnecessarily stringent and defective arrangements for meeting reasonable local demands have made it difficult for the poorer classes to satisfy their wants in a legitimate manner. Had more care and forbearance been exercised in instituting criminal prosecutions for petty breaches of rules in recent years, until experience had proved the necessity of the rules, and the sufficiency of the provision made for local supply by the arrangements in force, there would have been less justification than there is for the complaint of the memorialists that the actual policy pursued has been frequently very hard to reconcile with the professed principles of forest administration.

24. In conclusion, we desire to express our gratitude to our colleague, Rai Bahadoor Y. M. Kelkar, for the cordial assistance he has given us, and our appreciation of the conspicuous industry and ability with which he has from first to last, conducted his duties as Secretary of the Commission.

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WHEAT THRESHING IN THE PUNJAB.

IT may be interesting at a time when threshing machines are on view at provincial fairs, to notice exactly how a Punjabi does prepare his corn for the mill. Every one knows that the ox is the great motive threshing power in India. 'Thou shalt not muzzle the mouth of the ox that tradeth out the corn' is an essentially Eastern injunction. The Punjabi, however, does not seem to subscribe to it; for the Punjab ox at harvest time is muzzled as freely as the London dog in the dog-days. About the first day of *Boysakh*, the wheat is ready for the sickle. With the help of his relations and dependants, and a few hired labourers, the owner cuts his crops in instalments during the rest of the month, and stacks the shooks in a convenient spot by the village. The threshing floor is the first requisite. This is easily prepared. Selecting a fairly level spot, a menial drops on his hunkers and shifting frog-wise, ... ms a rough top-dressing, removing the grass with a small ... till he has cleared a considerable circle, he sweeps the floor with his hands a little, and passess it as complete. There is no attempt at pounding; hard, soft, or dusty, as the land happens to be, so is the threshing floor. The shooks are then opened out and strewn over it. If they have been piled any time, an hour or two will be sufficient for dryage. Dryage is most important, as apart from the matter of the grain in the ear, no straw, unless thoroughly dry, will break up into good *bhoosa*; and, moreover, the winnowing of the grain and *bhoosa* will be all the more tedious, unless the *bhoosa* is light and short.

The ox now comes into play. Four pair of bullocks will tread out the crop from an acre of land in three hours or so. The Punjabi has, at any rate, improved on mere confidence in the foot of the ox as a threshing machine. He yokes the ox to a species of harrow, composed of an ordinary hurdle dressed with branches of the *kikar* tree, and topped with some clods of earth for ballast. The cattle then begin their rounds. It is, for them, the Persian wheel performance over again, except that they are muzzled instead of blind-folded, and there is no music. Blows are not missed, however, as one man drives each yoke, while others rake up the corn—into the course of the horrow. The litter gradually forms into a hollow circle of shining *bhoosa*. If the crop is barley, the grain will have been threshed sufficiently by this time. If it is wheat, a good percentage of ears will still be intact; but in any case it is no use driving the cattle any longer, as the harrows make no impression on such shifting units. The circle of litter is now raked and swept up into a central heap; the corn that lies low in the dust being scraped up, dust and all, into small tributary heaps around the large one. These smaller heaps remind one of the street side heaps at Home, that await the dustman. Looking at them as exploitable reserves of food, it is easy to imagine that a peck of dust falls to the portion of all humanity in a life time; but still the counter-reflection at once arises to the intelligent mind, that "there is no necessity for any man to eat the whole peck at one sitting." Winnowing now commences. Scuttles are filled and refilled at the heap of litter, and the winnowers congregate at one spot, trusting to the kindly heavens. A longing for a thermantidote grows on the spectator as he notices how disagreeable an Indian heaven can be.

To watch a starveling cripple, a pauper of the village, game of one, if not both legs, standing, with his winnow high aloft at the length of his arms, doggedly waiting for a breeze, or hopefully letting an ounce of grain and chaff trickle from his scuttle at every stirring zephyr, is a picture of patience to cause the scalding tear. And unless there is a palpable breeze, the heavier chaff falls solidly with the grain full at the winnowers' feet, But even the re-winnowing is accomplished at last; unless there is a dead calm, which may last for days. The dust heaps also have emitted their heavy clouds from the shifting scuttle. The winnowers have scooped back a mass of grain behind them, and a heap of empty *bhoosa* has risen in front. But the grain is still alloyed with unthreshed ears. These are carefully sifted out by simple hand manœuvres, to be trodden out again, or threshed with simple sticks. The flail does not seem to have commended itself in this country. The grain of, say, 10 maunds to the acre, including about a couple of seers of dust per maund, and perhaps an equal quantity of burrs, may now be removed, and, if necessary, re-winnowed, as occasion requires, in the village. The treshing floor, if the ground is soft, is by this time badly cut up for all subsequent operations.

These simple expedients have up to date satisfied the ordinary native; but it is possible he may grasp the fact that they are capable of improvement. Remote villages have heard of the *Belati injun* exhibited at Amritsur; which is described as only a little less capable a contrivance than the American Sausage machine, which took in live cats at one end and produced priced sausages at the other. The native is not so conservative as not to be able to appreciate a really practical improvement that will save him labour in men and cattle, and not ruin him in outlay. The iron sugarcane presses are fast usurping the old wooden mills altogether because the out-turn of juice is greater, the saving in animal and human labour is appreciable, and their cost is reasonable. The wooden mill will soon be a thing of the past. If the English threshing machine is adaptable to native wants, the sooner information concerning it is disseminated the better. An exhibition tour would be the best plan possible. When the native has seen and believed, he will want to know the price. "What would be the price?" is the question immediately asked by an auditor of some fanciful description of the *Belati injun*, And a very practical question it is. Local bodies might apply for a machine, and hire it out at harvest time to prominent landowners. This plan would bring the invention before its proper public.—*C. and M. Gazette.*

THE OX WABLE FLY.

(Hypoderma Bovis DeGeer.)

BY ELEANOR A. ORMEROD, Consulting Entomologist to the Royal Agricl. Soy. of England.

THE Warble fly, or bot fly, is a two-winged fly, upwards of half-an-inch in length, so banded and marked with differently coloured hair as to be not unlike a humble bee. The face is yellowish; the body between the wings yellowish before, and black behind, and the abdomen whitish at the base, black in the middle, and orange at the tip. The head is large; the wings brown, and the legs black or pitchy with lighter feet.

The female is furnished with a long egg-laying tube; but whether she inserts her eggs into the hide or lays them on it has not been made out with certainty.

...-laying takes place *during the summer*: it may begin in the month of May; but the time varies with the weather, and with the cattle being on low land or hill pastures, and other circumstances. The egg is oval and white, with a small brownish lump at one end.

SYMPTOMS OF ATTACK.

The mischief may first be found on the flesh side of the hide early in the winter. Specimens received from Messrs. Hatton, Hereford, on November 13, showed the first appearance as small swellings in colour as if half a large shot was under the skin, and much inflamed round. The maggots were very minute and blood colour, and lying free, not in a cell with a fine channel down through the hide to where they lay.

The open warble was first found towards the end of January, and by the end of February, open warbles were noticeable in many places, and the maggot was now white (not being feeding in bloody matter), worm-like, and with strong mouth-forks; in its next stage it was club-shaped, and had a power of inflating itself by drawing in fluid until it was almost as hard and transparent as ice, and, lying small end uppermost, thus kept pressing the opening through the hide larger. In its next stage it gained its well-known shape, with a thicker and more prickly skin, the warble cell at the same time gaining its membranous coating.

The maggot can move up and down, but commonly has its brownish tipped tail at the opening, and it draws in air through breathing-pores in these brown-black tips or spiracles. The mouth-end is down below feeding in the ulcerated matter caused by the irritation of the perpetual suction of the mouth parts. The maggot cannot protect itself from the effect of applications, therefore anything put on the opening where the breathing tips show will choke the breathing apparatus, or run down into the hole and poison the maggot. The earlier this is done in season the better it will be for the animal, and the less difficulty there will be in the warble holes healing.

Whilst the maggots are in the warbles, though a skin-like membrane forms round the surface of the perforations, they cannot heal up because the maggot lies within, and when the warble grub has fallen out, though the hole contracts, the surfaces being already covered with a film of tissue are slow to unite; and, as may be seen in warbled hides, union is often prevented by this skin-like film shelling off, and laying with dried matter in the perforation. On the under side of the hide, though the *surface may* not be broken yet the subcutaneous tissues are often left as a mere film of no strength, which injures the surface of the leather.

When the maggot is full grown it is about an inch long and dark grey; it presses itself out of the opening *tail foremost* and falls to the ground, where it finds some shelter, either in the ground or under a stone or clod, where it changes to a chrysalis. The chrysalis is dark brown or black, much like the maggot in shape, only flatter on one side; and from this brown husk the warble fly comes out in three or four weeks, but this length of time is *increased by cold weather*.

THE METHODS OF TREATMENT.

With regard to methods of remedy there dees not appear to be any difficulty of getting rid of the warble maggot easily and cheaply, when the warble has ripened, that is opened so far that the black end of the tail is visible. Then it may be destroyed cheaply and quickly. From special observations, taken during the last two years, it has been found that where the warble maggots have been destroyed before they drop from the cattle, there is little if any summer attack of warble flies. Consequently the cattle can rest in peace, and, as there is very little egg-laying on them, there are scarcely any warbles in the following spring.

Squeezing out the maggots is a sure method of getting rid of them, but they may be destroyed easily and without risk by dressing the warble with a little of M'Dougall's smear, or by a little cart grease and sulphur, applied well on the opening of the warble. Mercurial ointment answers, if carefully used, that is, in very small quantity and only applied *once*, as a *small* touch on the warble; but where there is any risk of careless application it should not be used. Any thick greasy matter that will choke the breathing pores of the maggot, or poison it by running down into the cell in which it lies and feeds, will answer well; and lard or rancid butter mixed with a little sulphur has also been found to answer. Tar answers if carefully placed, so as to be absolutely on the hole into the warble. Bought cattle are often badly infested, and need attention.

To prevent fly attack in summer, train oil rubbed along the spine, and a little on the loins and ribs has been found useful; so has the following mixture:—Four ounces flowers of sulpher, 1 gill spirits of tar, 1 quart train oil; to be mixed well together and applied once a week along each side of the spine of the animal. With both the above applications it has been observed that the cattle so dressed were allowed to graze in peace, without being started off at the tearing gallop so ruinous to flesh, milk, and in the case of cows in calf, to produce.

A mixture of spirit of tar, linseed oil, sulphur and carbolic acid, has also been found useful, and anything of a tarry nature is use-

ful as sheep salve or bad butter and tar, mixed with sulphur; or Stockholm or green tar rubbed on the top of the cows' backs between the top of the shoulder blade and loins. Washes of a strong pickling brine applied two or three times during the season are very useful. Paraffin and kerosine are useful for a time but the smell goes off before very long.

THE GAD FLY.

Damage from galloping is also sometimes caused by the ox gad fly, a very different insect to the warble fly. The gad fly drives its jaw lancets into the cattle and sucks the blood causing severe pain in its operations; whereas the bot fly has nothing but an obsolete mouth and the above mixtures rubbed rather more generally so as to include the brisket would probably be serviceable against all fly attacks.

There are many other points that bear on prevention, of which one is—noting that bot flies are *most active in heat and sunshine*, and appear *not to pursue cattle over water*—consequently allowing the cattle the power of sheltering themselves, and access to shallow pools is desirable. Likewise with regard to pastures or standing ground of infested cattle it is matter of course that where the maggots *have fallen from their backs, the flies will shortly appear to start new attacks*

Warble attack is one of the few in which each owner benefits surely by his own work.

The attack of warbles is now grown to be one causing enormous animal national loss, estimated by practical men at sums from *two millions to seven millions pounds sterling per annum*, at the least, and there is no sort of reason why we should suffer it to go on.

Information would be gladly received regarding warbles on horses, which commonly occur singly on the back, flank, neck, or quarter. Specimens of the maggot, or of the warble fly to which the maggot turns, are much desired.

TOP-GRAFTING.

VERY VALUABLE SUGGESTIONS.

Every fruit grower should be able to do his own top grafting. Any one who can whittle a stick with a sharp knife can splice a graft on a twig so that it will unite and grow.

The value of being able to change a barren tree into a fruitful one, or one with worthless fruit so that it will bear the choicest fruit of that species, is an art not fully appreciated by fruit growers, and by this art we can accomplish many other very desirable things as the sequel will show.

It would be well nigh impossible to write instructions without the aid of engravings for grafting, so that the beginner or one who never had seen it done, could at once go on and do a nice job. But all fruit growers should have in their library the works on fruit culture of either Downing, Thomas, or Barry, where the different modes of grafting are nearly all plainly illustrated.

We will therefore confine this article to a peculiar mode of ... that has been found very valuable in securing certain results. We will call this terminal twig grafting. Its greatest value consists in enabling us to have fruits of any new variety in the shortest time possible, nearly always the second season after grafting, and not very rarely, if very carefully done and all things are as near perfect as may be, the same season the graft is set, and by this mode we can fertilize a barren or non-self-fertilizing native plum tree sooner than in any other way. Therefore we will confine our remarks to grafting the plum by which to obtain the above-named results, but it applies to all other fruits as well, but more particularly does this manner of setting the grafts apply to all the stone fruits Then for the plan. We will say that we have a large thrifty, hardy plum tree of any species of variety that either bears worthless, or is of good fruit, but barren from want of pollen from a different flower (which is very often the case) to fertilize its flowers. Then in march in the north, or February in the south, we proceed to graft it; when examining the tree we find that each of its main and sub-branches end in a terminal twig, or shoot, from a few inches to a foot or two long. Selecting such of these as we wish to graft we cut such twig or shoot off an inch or two from where it joins the two-year old wood with a sloping cut upwards with a keen smooth edged knife. We then take a scion or twig of the kind of fruit we wish to graft into it, and cut from it a section three to four inches long, and then cut its lower or but-end with a sloping cut downward as nearly as possible at the same angle as we did the twig to be grafted We then place these sloping cuts neatly together, being careful to have the two barks on at least one side to match perfectly, and then holding the graft in position with the thumb and forefinger of the left hand, proceed to wrap and tie them tightly together with any small strong thread or string and then cover the splice all over in any way with suitable grafting wax. There are no mysteries about grafting wax; even melted beeswax will do, but half beeswax and half rosin melted together would be better, and put on with a brush or swab when warm enough to be liquid. Even fine tough clay, worked up like putty, and put on thickly and then wrapped over and tied with strips of rag is excellent. The regular old official grafting wax is made by melting together beeswax three parts, rosin three parts, tallow two parts; melt all together, stir thoroughly, pour it into a dish of cold water, then "pull" and make into rolls like "lasses candy" as it cools and then is used by drawing it into strips and spreading and plastering it over the splice or joint of the graft, being careful to cover all cut parts. But it will be found more convenient to have the wax hot enough to be liquid, and so apply it. Our pet way is to cut paper cambric into strips about five-eights of an inch wide, and then run it through hot wax of the last mentioned kind, roll into balls and wrap the splice with it. This is very convenient and ever ready.

To top-graft successfully, one must have the grafts or scions in perfect condition. All scions for grafting should be cut late in the fall before severe weather, and carefully kept over winter. With all stone fruits, such as plum, cherry, peach, apricot, etc., fall cutting is absolutely necessary in severe climates, especially in the west, and they must be very carefully cared for over winter, being placed in a box in a cool, dry cellar, packed snugly in airy dry forest leaves, which are best. If they become too warm and damp so as to show calusing where cut, they are utterly spoiled. Especially is this true of scions of plum, peach, apricot nectarine, etc. If the scions are a little shrivelled when we wish to set the grafts so much the better. As before stated plum grafts must be set early to have success. If the top of the tree or scions has started in the least, or in other words, if the stored-up-starch has begun its change to sugar water, which begins at quite a low temperature in the plum, the grafts will rarely grow. But if the job is done right, and at the right time, we can have in a year or two our old barren plum tree, if it is of the Chickasaw type, and there are terminal twigs enough covered with the fruits of any variety, for many varities of plums, or with apricots, nectarines, peaches, all the hardy cherries, almonds, double dwarf flowering almonds, sand plums, Utah hybrid cherries, the beautiful, weeping foliage and double flowering plums; in fact we can have on the old barren Chickasaw plum tree, so far as we now know, fruit of every variety, of every species, of every tribe of the almond family, and they all grow nearly as well on the wild red plum of the north. No fruit tree grafts with more certain success than the plum. But the prime essentials are perfect scions and very early insertion, and another prime essential is the after care. So soon as the graft has fairly begun to grow and has nearly expanded a leaf or two, we must with a sharp thin knife cut down through the wax or clay and sever the wrapping threads And then again about the middle of June, if plum or cherry, go over each graft and slit with a sharp knife just through the outer bark of the stock, or b anch, for a few inches up and down, all around, just below where the graft was inserted, or the graft will be chok ed to death; or in other words, the outer bark of these trees is very hard and tough, and its fibres run around the stock or branch. Now in top-grafting, we cut the branch or stock off. The inserted graft is a long time in starting growth, and until it does start there is no sap movement under this bark, and it becomes more hard and tough. Then when the graft does start to grow, it starts vigorously. This farther depletes the stock of moisture and hardens it still more; then there soon comes the critical time when hundreds of layers of wood and bark cells must be deposited between the outer wood and inner bark; then if the corset strings of this outer bark are not cut as above, it is impossible for these layers of cells to be deposited. The descending nutrition forms a great swelling at the base of the graft, and the stock perishes below, and eventually, the graft. In such instances, the old theory was that there was uncongeniality, a want of assimilation between graft and stock, and it was no use to do much grafting for they could not grow. But if the corset string had been cut at the proper time, as above, such a theory would have been exploded

When top grafting a fruit, the first, requisite of the stock is that it should be fully hardy in the climate, and best if a strong vigorous power. The hardy cherries prove more hardy, more productive, and with larger healthier leaves and fruit when top worked on a hardy Chickasaw plum than they do on any other stock. But alas! All varieties of Chickasaw plums (Prunus chickasa) are not hardy north, but curiously some varieties of it are fully hardy far north. Particularly the variety known as Mariana, a very early large red variety from Texas. It is one of the most valuable and useful of the native plums as a fruit, and by far the best of all for a start to top-graft on, for the reasons that it proves perfectly hardy here, and much farther north; it is a very vigorous, healthy grower, throws up no suckers and grows quite readily from cuttings of the wood. It looks as though the introduction of this plum would revolutionize the growing and propagation of all our stone fruits. For we have the testimony of Prof. Budd that the sour cherries in the severe climate of Iowa, top-grafted on the Chickasaw plum have for may years proven a complete success, proving not only hardier, but more productive and with healthier foliage than when worked on any other stock, south. Several years of trial has proven that the peach worked (meaning grafted or budded) on this plum, escapes the dreaded yellows and the peach borer, and west, it has proven a perfect success for top-working the European plumps on. Taking it all together, the Almond family is a queer conglomeration. But to our top-grafting. By this mode we can change any thrifty, barren, or poor-fruited fruit tree at once into a most profitable or curious thing. If we have a vigorous old choke pear, we can make it give us an abundance of luscious Bartletts, Clapps, etc. Or, we can fruit these pears and others on the thorn apples, on mountain ash, on service-berry bushes, on the quince, and for a time at least on many varieties of apple trees, etc. We can fruit the fine European plums up high in the tops of our native plums. But in top-grafting we are obliged to keep within our species generally, except in the Almond family—with it old rules go all to pieces. But the *Pomeæ* or pear family is not far behind it in the line of its different orders, sub-orders and tribes in grafting on each other. In mild climates or in very mild winters, scions for grafting may be cut very early in the spring and do very well.

This by request of a Nebraska correspondent, who wished me to tell him through the *Farmers' Review* how to top-graft and bud. It will be more timely to tell how to bud in June.—*D. B. Wier in Farmers' Review.*

GOVERNMENT HORSE-BREEDING IN INDIA.

PAST, PRESENT AND FUTURE.

We give below the first instalment of the lecture delivered a few days ago at the Simla United Service Institute, by Mr. J. H. Hallen, on Government horse-breeding in India. The lecturer said :—

The late Stud Department was originally established in or about the year 1794 at Hajipore, on the banks of the Gunduk, in Tirhoot, North Behar.

In the same year, stud buildings were erected at Poona, which was considered a better and higher site.

Afterwards Stud Depôts at Koruntadhi, Buxar, and Ghazipore were established in the year 1816.

The moist climate and the soil generally possessing little trace of lime, of Lower Bengal proved unfavourable for horse-breeding but in the early days of the department the British frontier did not extend further north, so a more suitable site was not then available.

Mr. W. Moorcroft, appointed Superintendent of the Stud Department in the year 1808, was aware of the unsuitability of the climate and was desirous of removing stud operations to a locality possessing a drier atmosphere, and a soil on which an indigenous horse of good stamp might be found.

The fact, also, of the people of Bengal not being horsemen, but only accustomed to horned cattle, was against horse-breeding. These people had to be induced to follow the pursuit, and, as a rule, were frightened of horses and seldom attempted to ride them. The pecuniary inducement offered to these men to receive mares added much to the cost of rearing stock. Moorcroft was aware of this weak point, and was desirous of establishing, in some suitable spot, a colony of horse breeders, as his experience led him to believe it would be necessary to do so. Indeed, his desire was to place stud operations in a dry climate, with a suitable soil, and amongst people fond of horse-breeding.

A copy of Moorcroft's pamphlet I hand over to the Secretary, for the perusal of the Members of this Institution

Darwin, in his work "Animals and plants under domestication," Vol. I, page 63, remarks :—

"The horse can flourish under intense heat as well as under intense cold, for he is known to come to the highest perfection, though not attaining a large size in Arabia and Northern Africa. Much humidity is apparently more injurious to the horse than heat or cold. In the Falkland Islands horses suffer much from the dampness; and this same circumstance may perhaps partly account for the singular fact that to the estward of the Bay of Bengal, over an enormous and humid area, in Ava, Pegu, Siam, the Malayan Archipelago, the Loochoo Islands, and a large part of China, no full-sized horse is found."

In the year 1818 a stud depôt was established at Hapur, and afterwards (in 1843) that of Saharunpore was formed, and at a later date (in 1862) the Home Stud was created at Kurnaol.

It is to be regretted that when these later depôts were formed, those of the central Stud in Lower Bengal were not abolished, as stud operations would, in all probability, have been more successful, as the climate and soil of Hapur and Saharunpore have proved suitable for horse rearing, but that of Kurnaol, from being situated in the neighbourhood of low lands frequently submerged by canal water, did not prove congenial to horses.

The operations then instituted and continued until 1876 were as follows :—

Home.

Nisfi (half), or Assamee (agent.)

Zemindari.

The first, in buildings on stud lands, contained stallions, and mares, and their produce, till the latter was of an age fit for the army, the market, or for breeding.

The second, signifying partnership, consisted of mares the property of Government covered by its stallions and reared by the holders of the mares. Detailed particulars of this system will be found in the Final Report of the Special Stud Commissioners (1876), a copy of which I hand over to the Secretary for the perusal of the members of the United Service Institution.

The zemindari system consisted in Government stallions distributed in the country to serve mares the property of farmers. It existed to a very limited extent in Lower Bengal, simply because few private mares were kept by the people, their mode of conveyance being by bullock cart or by boat. In the North Western Provinces the people being fond of horses, a large number was found, in some districts of good, in others of poor stamp.

The Assamee system was introduced in or about the year 1858 in the North-West districts, and was very properly condemned by the stud committee (in 1869), of which General Colin Troup, C.B., was president—"As the plan of giving our Government mares killed the zemindari ones, for all the small farmers got rid of their animals, that they may obtain possession of those the property of Government."

A copy of the report of General Colin Troup's committee I also hand over to the secretary for the perusal of the members of this Institution.

In section III of the final report of the Special Stud Commission will be found fully detailed the terms of the zemindari system in the North West Studs, the results produced, and the state of the Stud in 1876.

In 1806, the abolition of the Studs, ten years after their establishment, was proposed by his Excellency the Governor-General in Council; but it was thought better to allow more time to duly test them.

In 1851., a Stud Committee, presided over by Sir Walter Gilbert, was convened to report whether the Studs should be maintained or not.

On account of the outturn of the Stud having proved insufficient for the demands of the army, and unsatisfactory reports of the remounts supplied having been received in the year 1868 69, His Excellency the Viceroy (Earl Mayo) in Council directed that a Committee should be appointed to report on the state of the Studs. The Committee was presided over by Major-General Colin Troup, C B., and, as will be seen from the report, the conclusion arrived at by the Committee was that the Stud was "in a most unsatisfactory state, from the following facts:—

(1st) The steady decrease in the number of remounts;

(2nd), the large proportion of unsound horses;

(3rd), the great number of narrow chests and twisted forelegs; and—

(4th) the very bad results of the Stud operations, as shown by the remounts of the last year (1868.)."

In the year 1872, His Excellency the Viceroy (Lord Northbrook) in Council ordered a special Stud Commission to assemble, with the view of re-modelling the Stud Department. The measures ordered by the Government of India to be carried out will be found detailed in the final report of the Commissioners.

Subsequently the orders were modified by the Secretary of State for India, in despatch No. 58, dated 20th March 1873 (in reply to the Goveanment of India Despatch No. 9, dated 10th January 1873), wherein the Right Hon'ble the Secretary of State of India records—

"I find in the Report of the Stud Committee, presided over by Major General Colin Troup, C B., the following startling conclusions :—

(a) That the Stud Department is able to supply only 550 horses per annum to the Bengal army;

(b), that the cost of these amounts to either £148 or £219 each, according to the different modes of debiting expenditure to the Department;

(c), that the Government studs have failed to produce any amelioration in the indigenous breed of horses;

(d), that Government interference in horse-breeding has completely paralised private enterprise.

"It further appears in this connection that while Government, by its breeding establishments, can only supply a troop horse at the exorbitant price above mentioned the open market supplies the Punjab batteries with horses from Central Asia *viâ* Cabool at £40 each, the Bombay Army with horses from the Persian Gulf at £55 each, and the Madras Army with horses from Australia at £57·10 each, though in the latter case the price is enhanced £91 by the unwise retention of the animals purchased at the Oosecor Depôt.

"The Report of the Committee also records practices adopted in the Studs respecting the breeding and rearing of young stock which are undoubtedly at variance with all the principles admitted as sound by practical breeders in this country. And although such practices have been repeatedly condemned dy local enquiry in India they appear to be chronic in a Government establishment.

The question of the retention of Studs in India has been frequently raised. In 1806, ten years after their establishment the Governor-General proposed their abolition; but the experiment was not considered to have been sufficiently tested, In 1851, a Stud Committee, presided over by Sir Walter Gilbert, was directed to consider whether the Studs should be maintained or abandoned. The Committe recommended their retention, but pointed out great past mismanagement. They considered, however, the present system capable of great improvement, which, if carried out, would render the Studs more profitable, and capable of supplying a better description of cattle than at present.

"Notwithstanding the recommendation of the Stud Committee, supported as it was by the Government of India, the Court of Directors called for further information, and the Secretary of State (Sir Charles Wood), in his Despatch of 12th January 1860, stated that it was the intention of Her Majesty's Government to keep in their own hands the ultimate decision as to the maintenance or abolition of the Government breeding studs, and desired that no steps should be taken as to the re-formation of the Stud Department until the whole question had been reported on.

"Very favorable reports were received* from India in reply to the repeated demands for information from the Court of Directors and the Secretary of State. In accordance with the Memorandum of the Government of India, Sir Charles Wood, thereupon in his Despatch of the 18th October, 1860, sanctioned the retention of the Studs. It appears clearly however, that the main ground of his decision was the satisfactory, and as it now turns out, illusory information given him as to the cost of a Stud horse. The cost of each description of horse supplied to the Army was stated to be—

"Stud horse	...	Rs. 674 7 (£67)
"Cape horse	...	Rs. 631 7 (£63)
"Australian	...	Rs. 905 9 (£90)

If the facts had been presented to my predecessor in Council, such as they now turn out to be I cannot doubt that he would have decided that the sound principle to follow, in order to make India self reliant in the supply of horses, is to be found in the encouragement to be afforded by Government to private enterprise, and not by undertaking themselves the function of horse-breeders.

"But although I have arrived at the conclusion that it is inexpedient to maintain the establishement of Government studs, I am by no means insensible to the advantages that may be obtained by judicious patronage on the part of Government.

"Various favorable breeding districts in India are to be found; amongst these the Punjab, Katiawar, the valley of the Bheema, and Mysore are pre-eminent. If in localities well selected stallions are furnished by Government; if agricultural exhibitions be fostered

* Stud horses were stated to cost less than a horses could be bought for in the market; the quality of the animal very well spoken of and the opinion of Sir George Anson (then Commander in Chief) was cited as to the goodness of the stable management in the Studs."

and prizes offered for promising brood mares and young stock; above all if the Government announce that they will be prepared to give liberal prices for any suitable three or four-year-old colt that presents itself. I cannot doubt that the ancient and successful practice of private horse-breeding in India would revive.

"With due notice, and by proper arrangements, a supply of 40 to 50 stallions might be obtained per annum from England, of the following classes:—

(1) Thoroughbred English.
(2) Roadsters, or Trotters.
(3) Half-breds, or Hunters

Though in reference to several remarks as to the latter class that appear in the collection before me, I may observe that not only are no such horses to be procured in the market generally, but English breeders greatly prefer as sires either pure Thoroughbreds or pure Roadsters. The facilities offered by the Government transports for conveying stallions to India *vi*a the Suez Canal, tend considerably to diminish the price of stallions imported into India."

The special Stud Commissioners completed their labours in 1876, and the recommendations made by them, regarding the future remounting and development of horse-breeding in India will be found recorded in their Final Report.

On the abolition of the Stud Department, the Government of India sanctioned the formation of two Departments, *via*, Army Remount and Horse-breeding Operations.

The Department of Army Remount Operations to be supplied with Australian and Persian horses purchased in the local markets, and as many of country breed as procurable.

The Department of Horse-breeding Operations to be established on the following principles:—

(*a*) The supply of Government stallions to serve gratis only carefully selected and branded mares;

(*b*) The branding to impose no claim on either side, but to be the condition of using the Government stallion.

(*c*) The prohibition of the purchase of branded mares by the Native Cavalry or Police;

(*d*) The liberal grant of prizes at Fairs and Horse shows, with some slight advantages to the produce of branded mares in competing for prizes;

(*e*) Some assistance to teach the breeders how to castrate the young stock, and to encourage the practice;

f) The ready purchase, by Government agents, at remunerative prices, of all horses fit for the service;

(*g*) The number of stallions to be employed in the breeding districts to be at present fixed at three hundred.

The results of horse-breeding operations may be briefly stated as:—

(*a*) Improvements in the breed of Indian horses to an extent perhaps greater than was expected in the space of eleven years;

(*b*) Appreciation by native horse-breeders of the principles adopted by the State in developing horse-breeding;

(*c*) By their being desirous of rendering their mares eligible for mating with Government stallions, and readily bringing them to inspecting officers with a hope of their being approved and branded;

(*d*) The gradual increase in the number of mares so approved and branded:

(*e*) Producing improvement in local breeds in suitable districts throughout India:

(*f*) Inducing natives to breed and rear more horses than heretofore;

(*g*) Teaching breeders how to properly rear their young stock;

(*h*) The fact that superior stock is being raised is proved by Native Cavalry Remounts bringing higher prices;

(*i*) Horse-breeding is increasing in India;

(*j*) The good condition of stock competing for prizes at Horse-fairs and Shows, whereby improvement in stamp is advanced;

(*k*) The services of Government Salutris* and Castrators being gradually more employed, and thus young geldings have more liberty and a better chance of developing in frame and limbs

24. It was ordered in 1876 that the officers of the Department should be as follows:—

1 General Superintendent,
1 Assistant Superintendent, North-Western Provinces and Rajpootana.
1 Assistant Superintendent, Punjab,

and in the year 1881, one Superintendent was appointed for the Bombay Presidency.

Mule-breeding operations were afterwards incorporated by the General Superintendent, with the sanction of the Government of India, and the number of donkey stallions was limited to 300. Thus, horse and mule breeding have been fostered and encouraged and the industries have become developed in agricultural districts.

Government horse and donkey stallions are distributed in the most suitable districts, and are cared for in accordance with the Rules laid down for the guidance of officials in charge. A copy of the Rules I hand to the Secretary for record and reference.

The present strength of horse stallions in the Department of Horse-breeding Operations is as follows:—

Classes.	Bengal Presidency.	Bombay Presidency.
Thoroughbred English ...	73	17
Hal-bred English and Norfolk Trotters,	144	15
Australian	5	1
Arab	79	67
Persian	1	0
Stud-bred	10	0
Turkoman	2	0
Total ...	311	100

The stallions best suited for Indian stud work are English, of the Thoroughbred and Norfolk Trotter, or Roadster breeds; also the Arabs, and some of those bred in the old Stud Department have proved good stock getters; but as the country-bred mares are generally wanting in size and light in bone of limb, the Norfolk Trotter has proved the best sire for giving greater size and improving the bone of limb in England. The Thoroughbred horse, when mated to mares of light bone are found invariably to produce weedy stock; hence it is now the custom to mate half, on three-quarter-bred mares possessing large boned limbs with the Thoroughbred; and in this way is good-boned stock produced.

We in India have, as above noted, only light-boned mares to breed from, and consequently it is found that the Norfolk Trotter or Roadster is the best stallion for such mares. The great improvement effected by the use of the sires is generally admitted, but it is thought, by some interested in horse-breeding, that the Norfolk Trotter sire is being too much employed, and will cause the stock to become too coarse and heavy. These half-bred horses are really pure half-breds, and possess pedigrees of many generations; thus we can count upon their stamping their produce in a well-marked manner. The stamp of horse represented by the Norfolk Trotters, found in the Indian stud, is one admirably suited for Horse or Field Artillery, or British Cavalry; indeed, if those branches were horsed with and mounted on Norfolk Trotter stock, selected according to the respective work required of them, it would be said that they could not be better horsed. Therefore, by employing these stallions with the country-bred mares, we do obtain improvement in stamp, and can but hope that by steadily continuing to employ this class of stallion, more improvement will be evidenced in every succeeding generation. It is difficult to understand how stock bred from originally undersized and underlimbed mares, by horses of weight, size, bone, and breeding, considered most suitable; can become coarser and heavier than their sires.

(To be continued.)

PEPPER ADULTERATION.

THIS subject continues to attract a great deal of attention in the spice trade, and the action of the authorities, although somewhat tardy, is welcomed with pleasure by those who have made a specialty of ground pepper, but who have recently found that their businesses were suffering severely from illegitimate modes of competition. As has been frequently pointed out, the retail grocers, if they had the desire, which is unlikely, have no motive for selling adulterated pepper, as its sale, even if it were prepared by themselves, which could not be easily done, would yield them no appreciable profit. Conducted on a wholesale scale, however, pepper adulteration to the reckless extent practised of late, may of course be exceedingly profitable, and those who actually carry it on are as yet beyond the reach of the law, and it would seem that the real offenders are yet unknown, as they have only let their commodities reach the distributor through intermediaries, who were entirely ignorant of the character of the goods that were being supplied through them. The result, nevertheless, has been that many respectable retail grocers who bought in good faith have had to figure in the dock, and have had their good names aspersed for what profited them nothing. It is therefore distinctly to the interest of shop-keepers that pepper adulteration should be stopped, and they have, no doubt, also every desire to help the wholesale trade in putting a stop to the practice. "Poivrette," according to the directions given in our issue of March 19, is easy enough to detect, but as the fraudulent admixture of that substance cannot be found out by the unassisted eye, the retail trade have not the necessary appliances, and it is mainly price, and the names of the houses that make the offers, that form a guide in purchases. The wholesale profit on ground pepper has always been small, and the present first market cost of the various qualities is as follows:—

	Whole.	Cost of Grinding & Packing in Barrels.	First Wholesale Cost of Pepper Ground.
	Per lb. d.	Per lb. d.	Per lb. d.
BLACK.			
Penang (dirty, with from 14 to 20 per cent. of dust, earth stones, &c.)	6¼	0⅝	6⅞
Penang (cleaner, with 7 to 8 per cent. of dirt) ...	6⅝	0⅝	7¼
*Singapore	7¼ to 7⅜	0⅝	7⅞ to 8
*Alleppy	7⅜	0⅝	8
*Tellicherry	8	0⅝	8⅝
WHITE.			
Penang (not quite clean) ...	11⅜ to 11½	0⅝	11⅞ to 11⅞
Singapore (cleaner) ...	1/0⅝ to 1/0¾	0⅝	1/1 to 1/1¼

The white pepper market is 0¼d. to 0½d. higher during the last three weeks, so that pepper bought before that time can be offered that much per lb. cheaper.

* Brushing and sifting adds 0¼d. to 0⅜d. per lb. to the above, and on Penang, considerably more. Some sifted Penang offered at public auction this week has been sold at 7¼d. per lb.

The commoner qualities of white pepper (made from the broken portions of the corns of black pepper, left after the removal of the actual dark skins in decortication) can be offered at lower prices, when the operation of taking off the husks is performed in this country, than the old form of white pepper prepared abroad,

Though a perfectly legitimate article of commerce, experience has shown that for some unknown reason, the decorticated pepper, even when much better in colour, has lost much of the flavour and strength found in the old forms. Still, as said above, though the latter are better in quality, there is no objection to the former. With regard to "poivrette," or false pepper made from olive stones, it is not the only foreign substance used. Long pepper, an entirely different product, with quite a different flavour, is often extensively used to mix with white pepper, because it is 4 to 5d. per lb. lower in price; many are found to defend this admixture, because they hold that both substances have the name of pepper." But the analysts quite properly think that not only a part of the names, but the materials themselves, should be identical, in a substance sold under one name, and several convictions of retailers have taken place for this admixture. Indeed, the earthy medicinal taste and peculiar drug-like smell of long pepper, quite destroys the flavor of white pepper, There is another point as to which the grocers have to be cautious. In the process of husking black pepper to get at the white kernel for white pepper, a very large proportion of husks is created, and to grind them up either by themselves or with only a small percentage of the inner portions of pepper, and then to sell the product as "pepper," appears to be certainly undesirable. Although black pepper is ground with the husk on, yet the admixture of a larger proportion of the husk than is natural to the pea of Pepper is scarcely justifiable, unless for uses other than for human food. There is no objection to Pepper husks being used as a condiment under their own name, or to their being mixed with cattle spice, or used in similar rough ways, but it is stated that the analysts have decided to return any extreme proportion of husks as an adulteration. If the decorticated husks are ground and sold as "pepper" an otherwise unaccountable but frequent occurrence would be explained. It is by no means uncommon for what is called very fine ground black pepper to be offered at less than the prime cost, without adding any profit or the ½d. per lb. for grinding) of the very commonest whole Penang.

Beyond these points of more or less direct adulteration, there is the difficulty caused by the dirty way in which black pepper is prepared abroad. It appears to be dried on the open ground or on earthen floors so that almost all of it contains more or less dirt and stones. This specially applies to the Penang kinds, and the other descriptions contain much less, though still some. Some sifted Penang pepper has been offered for sale this week, and it is to be hoped that the very satisfactory price obtained will lead to a more cleanly system generally. In some cases also Pepper is screened and brushed here before grinding, which reduces this risk to a minimum. The analysts appear also to make reasonable allowances on this score, and by buying the better qualities of black pepper, the retailer would be amply protected. In conclusion it may be pointed out that now that prosecutions for the sale of adulterated Pepper are so numerous it is necessary for the retail trade, for their own sakes, to look carefully into be subject, as the adulteration is not practised by them their clear interest is to help the wholesale trade and the authorities in stamping it out. From what is reported the analysts of the country are about to follow this matter up closely and the result has already been a large increase in the demand for real pepper, a fact which shows conclusively the extensive scale on which adulteration has been practised.—*Produce Markets' Review.*

ARTIFICIAL HATCHING OF FISH.

SETH GREEN.

In the artificial hatching of fish eggs, there are three principal conditions necessary, without which success can rarely be attained. These are cleanliness, careful handling of the eggs, and plenty of circulation. The importance of providing these can hardly be over-estimated.

CLEANLINESS.—One of the main reasons why artificial propagation is superior to the natural method is in this particular. The eggs must be kept free from sediment or dirt in any form whatever, or else they can never reach the hatching point. We will take the clear flowing brook as we observe it casually: it has the appearance of being free from all foreign substance, but by examining it closely, we discover that in the bed of the brook a great deal of matter is constantly moving downward; this has the tendency to cover up all eggs which have been cast, and when this occurs, the egg will never come to maturity. In hatching eggs artificially this is guarded against by filtering the water through flannel screens and also by having a large tank into which the water flows before entering the hatchery. This gives the impurities a chance to settle at the bottom, and the water will become purer; and when it afterward flows through the flannel screens it is purified to a still greater extent. But even with these precautions a great deal of sediment will force itself through into the hatching apparatus, and the eggs, have to be looked over and feathered nearly every day in order to keep them bright and clean. The hatching apparatus itself needs frequent washing to keep it free from the matter which accumulates on it. Without the observation of scrupulous cleanliness, artificial propagation would not in this respect, be superior to the natural.

CAREFUL HANDLING.—This in my opinion is a most important consideration and one that cannot be over estimated, Some persons claim that there are stages in the development of the eggs when they can be handled very roughly, and will stand a great deal of abuse without injury. This is contrary to my experience. From the time the egg is first taken until it is hatched the utmost caution should be taken to prevent any ill usage. While there is undoubtedly a certain period when the eggs are less liable to be killed by exposure to some amount of hardship than at other times, still, I find that the most careful treatment we can give them is none too good, and the more gentle we are with them the larger a percentage of strong and vigorous fish breaks through the shell of the egg. Even in "feathering" them over with the bearded side of a feather in search for dead eggs, it would be better if the eggs were not touched but simply moved by the agitation of the water. It is also important that the eggs should always be entirely under water while examining them. "Handle with care is an injunction, the commonsense and value of which, demonstrate itself to any one, as his experience in fish culture extends.

PLENTY OF CIRCULATION.—The object to be kept in view in the construction of apparatus for hatching fish eggs is to have it so arranged that the eggs or spawn will receive the constant action of flowing water without being washed away. By "plenty of circulation," is meant sufficient to keep the eggs slightly in motion, but not enough to move them violently. The eggs of some fishes are much lighter than those of others, For instance, those of the trout and salmon are much heavier, and more bulky, than those of the shad or white-fish. Consequently, different apparatus has to be used in the hatching of different kinds of fishes. A successful fish hatching apparatus should be so constructed that the water circulates freely around each individual egg, and this current must not be allowed to cease from the time the eggs are first put in until the fishes are hatched. Absence of circulation results in sure death to the eggs, and this is one of the reasons why so few eggs, cast naturally, produce a fish. The egg must be fortunate, indeed, to become located in as favourable a position as can be given to it under artificial propagation, Taking into consideration the number of eggs cast by all kinds of fish, I do not believe the average of those hatched is more than one in a thousand, and this is a liberal estimate.—*American Agriculturist.*

THE PRICE OF RUPEES AND WHEAT,

TO THE EDITOR OF THE "ENGLISHMAN."

SIR,—A fallacy which should be exposed is the widely endorsed assumption that a fall in the price of the rupee bestows upon the farmer exporter of Indian wheat a proportionate advantage over other growers of wheat in countries having a gold standard; or that the fall in the price of the rupee from 1s. 11d. to 1s. 6d., has as great an effect on the competency of the Indian grower to sell cheap as if a bounty of Rs. 8 in Rs. 40 were given him.

Also that his, the Indian's, export is the cause of wheat falling from Rs. 40 to Rs. 32.

The argument is also put in this way. Ten years ago two sovereigns would buy Rs. 22, which would buy one quarter of wheat.

To-day two sovereigns can buy Rs. 28, which can buy 1·3·11 quarters of wheat. The Indian farmer, in short, can afford to, and does, give the 3·11 quarter extra for the same two sovereigns.

At first it would appear as if this 3·11 of a quarter acted as a bounty, but reflection will show the fallacy of that conclusion.

The fallacy is equivalent to any of the following propositions:—

1. That if the total annual export of Indian wheat had not been exported from there, but had instead been grown in England or exported from America, the price of wheat would have remained at Rs. 40.

2. That the Indian grower has had a bounty of Rs. 8 per quarter, and has been ass enough to sacrifice every penny of it in order to sell his production.

3. That English and American farmers have for years been selling their wheat at Rs 8 under cost.

4. That, but for the advent of Indian wheat, and the fall of the rupee, growers of wheat in England would have been making a profit of Rs. 8 per quarter.

The conclusion is that a fall of 25 per cent. in the prices of the commodities which exchange for English wheat, has as precisely a similar effect on the competency of the English grower to take a reduced price, as a 25-per-cent. reduction in the price of the rupee has on the Indian grower.

If I can prove from facts that the fall of the goods that exchange for English wheat has been greater than the fall of the rupee, I shall have proved that, instead of the Indian grower having a bounty, the reverse in the case, and that nothing but economy on the part of the Indian enables him to export at all.

The following is a summary of the commodities that exchange for English wheat, 1871 to 1885, maximum and minimum prices subtracted, and the fall in prices reduced to a percentage:—

	per cent.		per cent.		per cent.
Silver	27	Jute	50	Silk	40
Bacon	35	Fruit	33	Rum	30
Ham	27	Guano	28	Sugar	50
Beef	30	Hides	28	Tea	30
Butter	20	Leather	20	Tobacco	25
Cheese	29	Copper	60	Mahogany	30
Coffee	36	Iron	60	Timber	46
Wheat	40	Lead	50	Wool	35
Barley	36	Zinc	40	Coals	60
Oats	28	Oil (Fish)	40	Beer	15
Maize	35	Onions	42	Cotton Yarn	40
Cotton	35	Petroleum	70	Floor Cloth	25
Eggs	20	Pork	35	Soap	18
Fish	20	Potatoes	30	Carpets	34
Flax	30	Rice	30		

The above figures are taken from the Government statistical summary for 1885, and do most conclusively prove the fallacy of the bounty idea.

The above is a letter in a Manchester paper of the 31st of March, and is signed D. Curr, 2, Cromwell Street. It may be useful to publish it when you have room.

T. H. S.

Calcutta, April 27.

DISORDERS OF DIGESTION.

"Many of the ancient physiologists held that the process of digestion was one of maceration, or, as they termed it, *coction*, *i.e.*, that the food was merely broken down under the combined influence of moisture and warmth. Again, it was thought that digestion was merely a process of trituration; this was the result of false inference by analogy with the fowl's gizzard. The falsity of this conclusion was first exposed in 1752 by the French naturalist, Reaumur, who experimented on a tame buzzard, which, like the owl, hawk, &c., swallow of its foods and subsequently exgurgitates the hairs and other undigested matters. He caused the buzzard to swallow food placed in little metallic tubes, shut at one end and covered at the other by muslin, so as to preclude the possibility of the food being triturated, and yet permitting the gastric juice to exert its solvent action. He found the food was dissolved in the tube. He ascertained that even bone became softened. He placed a piece of sponge in the tube, and introduced it into the stomach, and he obtained the sponge soaked with gastric juice.

"After Reaumur, Dr. Stevens, in an Inaugural Thesis, presented in 1777 to the University of Edinburgh, detailed some very curious experiments. He availed himself of the presence in Edinburgh of a Hungarian who had the power of swallowing stones, and then regurgitating them. Stevens caused this man to swallow little silver balls with holes lik a sieve, so constructed as to admit of being filled with food and closed by screwing. Dr. Stevens found that after these balls had sojourned in the stomach for some time, their contents were dissolved. The same investigator also obtained the gastric juice of a dog, and observed that when placed in a warm locality it had the power of digesting meat.

"Spallanzani, by experiments on fishes, reptiles, and on himself, confirmed and extended the results previously arrived at by Reaumur and Stevens. We thus see that before the end of the last Century the action of the gastric (stomach) juice was tolerably well-known.

Starch is, of course, digested in the mouth, while albuminous substances like meat, white of egg, gluten of bread, casein of milk or cheese, and the vegetable casein of peas, are digested in the stomach. *Starch, albumens and fat* are all digested in the intestines. Only one, therefore, of the three great classes of foods is digested by the stomach-juice. After food has been received into the stomach, it is usually two hours at the very least, before the slightest particle of it is allowed to pass onward from this organ. The stomach contents are moved about freely by the muscular action of the gastric walls, and as complete digestion is effected, the veins begin their work of absorption, and carry the absorbed food to the liver. When indigestion is present, the food may remain in the stomach as long as from twenty-four to forty-eight hours. Putrefactive digestive products occur in such an event, and by the gradual absorption of these a pitiful train of symptoms appear. The man is poisoned by himself. His digestive organs give the blood poor fuel, and the blood, in this manner deteriorated poorly nourishes the whole frame.

The patient with indigestion generally has a bad taste in his mouth in the morning, a hacking cough, with considerable secretion, which is mostly from the head and throat; and a feeling of weariness and heaviness is constantly upon him. Pain over the eyes, headache, dizziness, yellowness of the white of the eye, loss of appetite, a feeling of lassitude often in the forenoon, stomach cramp, pains in the chest and loins, acid, eructations, water-brash, flatulence, extreme distension constipation, often alternating with diarrhœa, cold hands and feet, palpitation of the heart, spots before the eyes, moody spirits and extreme melancholy—these are a few of the symptoms induced by indigestion of the food.

Most people suffer at some period of their lives with dyspepsia, and its great prevalence bespeaks the improprieties of our modern modes of living. It is the cause of many serious complaints, and oftentimes, underneath dietetic treatment, the seemingly impending dangers vanish as "Memnon with the dawn."

The practical question thus arises—What is the proper treatment? It rests in one of two things, according to circumstances:—Following out the idea of Professor Corvlsart, of Paris, the active digestive principle of the stomach—called pepsin—should be given in the less severe types of cases. The best form in which pepsin can be taken is in pure scales supplied in Tabloids; these Pepsine Tabloids are beautifully prepared, and extremely pleasant to take. Children will eat them like sweets. They are certainly highly efficient, for they assist the stomach to do its work. In the more serious forms of indigestion, and in low disease, the proper treatment is always to peptonize the food with Zymine before it is given, and thus do for the weakened digestive organs what they are unable to perform for themselves." This leads us to the greatest advance in medical science made in recent years—an advance which is revolutionising the entire realm of dietetics.—*Health.*

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THE INDIAN AGRICULTURIST.

A WEEKLY

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 26TH MAY 1887.]

Madras.—General prospects good.

Bombay.—Slight rain in parts of the Dharwar, Kanara, and Shikarpore districts. Preparations for *kharif* sowings continue everywhere. Fever and small-pox in parts of eight, cattle-disease in parts of twelve, and cholera in parts of five districts.

Bengal.—Weather hot and close. Showers fell in some districts of Bengal Proper, but no rain is reported from Orissa, Chota Nagpore, and the greater part of Behar. Rain is generally wanted. Ploughing and sowing are going on. Early rice and jute are coming up well. Sugarcane is promising. *Boro* rice harvest is nearly got in. General health is better, cholera having diminished

N.-W. Provinces and Oudh.—Weather seasonable. Dust storms with slight sprinkling of rain reported in a few places. Sugarcane and indigo crops promise well Supplies ample and prices generally steady. Small-pox continues in some, and cholera, for the most part of a sporadic type, in several districts. Cattle-disease lingers in a few districts.

Punjab.—Slight rain has fallen in the Umballa and Peshawar districts; two tenths in Feroz pore, one tenth in Umritsar, and one-tenth in Mooltan. Health in Peshawar is fair, elsewhere good. Prices are stationary in Hissar, Ferozepore, Umritsar and Mooltan, fluctuating in Delhi, rising in Umballa, Rawal Pindee and Peshawar, slightly falling in Jullundur, and high and almost stationary in Shahpore. *Rabi* crops below average in Jullundur, Rawal Pindee and Dera Ismail Khan, and poor in Shahpore. *Kharif* sowings in progress in Mooltan and Peshawar. In Shahpore fodder is scarce and cattle are suffering.

Central Provinces.—Weather cloudy and hot, with slight sprinkling of rain. *Kharif* ploughings continue. Fever and small-pox in places. Slight cholera in Jubbulpore and Sumbulpore. Prices generally steady.

Assam.—Weather warm and sunny, with occasional rain. Ploughing and sowing of *dumai* and *murali* crops not entirely finished for want of rain. Cultivation of *sali* crops progressing. Planting of sugarcane progressing. Prospects of crops good. Cattle-disease and cholera reported from Hailakandi, Katigora and Lakhimpore, in Cachar, and *kala azar* in Chomaria tehsil, Gowhaty, otherwise public health fair. Prices stationary.

Mysore and Coorg.—Standing crops in good condition. Prospects of season continue favourable. Public health good. Small-pox and cattle disease prevalent in parts. Prices slightly risen in the Mysore district.

Berar and Hyderabad.—Weather very hot and sometimes cloudy. Rain wanted. Land being prepared for *kharif* cultivation everywhere. Reaping of *rabi* crops continues. Condition of cattle good, except in Akola. Cholera still prevalent in Hyderabad, otherwise public health fair. Prices steady.

Central India States.—Weather seasonable. Week rainless. Prospects of crops good. Small-pox in Lashkar and Goona; health otherwise good. Prices fluctuating.

Rajpootana.—Week rainless; weather very warm, but seasonable, with high westerly winds. Tanks and wells going down. Sugarcane being irrigated. Prospects of crops favourable, except in Kherwara, where the outturn is estimated below average. Cholera in Bhurtpore; small-pox and fever in Dholepore. Ulwar and Bikaneer; otherwise public health good. Prices generally steady.

Nepal—No report received.

Editorial Notes.

WE reproduce this week an article from the *Times of India* on "the wheat-growing competition of the world." Our contemporary, we are glad to see, bears out our own views as to the causes that have brought about the expansion of India's wheat trade. It is time, we think, that the low exchange fallacy was exploded.

A BROTHER of our "only General," Mr. F. J. Wolseley, is, we are told, making quite a stir amongst the flock-masters of Australia. He has patented an invention by which sheep can be sheared by machinery. It has hitherto been thought that in this industry, at least, manual labour could never be displaced by the mechanical. Lord Wolseley's brother has, however, demonstrated this to be a fallacy. His machine can shear a sheep clean in three minutes forty-five seconds. We remember hearing something of such a machine some time ago, but connot recal to mind the exact circumstances connected with it

ARTESIAN wells have been utilised with great success for fertilising the African desert. Sir R. Lambert Playfair, in the course of a consular tour in Tunis, has visited the ground where the first well was sunk, and reports most favourably as to the success of the project. A space of 375 acres has been cleared, and sown with cereals and lucerne, a vegetable garden been made, and a nursery of young trees planted. Two other wells are being sunk, which on completion will irrigate 7,500 acres of land. The Bay of Tunis has conceded to the Artesian Wells Company 25,000 acres of land, which they can select themselves from districts which are at present of no value.

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IN another column we reproduce from our Lahore contemporary "a suggestion for agriculturists"—a suggestion which we entirely support. We have repeatedly directed attention to the want of enterprise in this country in the development of its natural resources, especially in reference to its indigenous vegetable products. There is a very wide field indeed in this direction. The oils named by our contemporary, with the exception of wintergreen, could all of them be manufactured here, as the plants grow here luxuriantly, and could be cultivated at a very low cost. Lavender, aniseed, coriander, fennel, carraway, dill, and rosemary, can all be successfully grown in this country. There is everything in this country but enterprise.

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THE *Financial and Mining Record* of New York describes a new machine for pulverising, or grinding, of the hardest substances by the action of air set in motion, resembling that of a cyclone. The air is confined in an iron chamber not larger than an ordinary house furnace. At a test given in the paint factory of McDougall, Logie & Co., where the machine has been in operation for six months past, nails, iron, slag, and flint rock were reduced to an impalpable powder, while the operation was equally effective with phosphates, mica, asbestos, rice hulls, and other pulpy and soft substances. The device is very inexpensive, and so far as the investigation showed, accomplishes results so important, as to point to a revolution in pulverising and grinding operations in numerous departments of trade.

Our Lahore contemporary says :—"The experiments now being made with compressed fodder, are a step in the right direction, but the cost will make that forage prohibitive in time of peace. The bales made up on Rogers' system, are of an inconvenient shape for loading on mules, and the cost of baling, 12 annas per maund, is extravagant. It is surely possible for the Indian Government to have devised a press, which shall be worked for one-fourth of this price, and thus reduce the railway charges, which are such an enormous item at every Camp of Exercise, or large move of troops. This must be done in time of peace: when war breaks out, it will be too late, and a return to the old system, under which the cost of baling a maund of grass was one rupee, will be the result, as it was during the Russian scare of 1885."

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It is curious to note the great advance the Indian tea trade has made during the last few years. Of course the trade is chiefly with the United Kingdom, and the statistics for the period from June to April show that the imports of the Indian leaf into England increased from 60,870,000lbs. in 1884-85 to 77,195,000lbs. in 1886 87; while the imports of China tea during the same period fell from 141,774,000lbs. in 1884-85, to 139,398,000lbs. in 1886 87. This is certainly not a very remarkable decrease, but it goes to show that the China leaf is steadily losing ground in the face of Indian competition. Ceylon tea has also made very striking progress. The imports during the same period in 1884 85 only amounted to 2,231,000. lbs. This quantity nearly doubled in 1885-86, and reached 7,174,000lbs. in 1886-87. This is certainly very satisfactory, and the little island is to be congratulated upon the result.

The report recently submitted by Mr. Herbert on the trade of Persia contains a great deal of interesting information regarding the Persian opium trade. He tells us that opium is the chief article of export from Persia; the annual exports of the drug having amounted to about 2,500 cases, valued at £170,000. The poppy is grown around Ispahan, but the cultivation is steadily extending, and is said to have encroached on the lands available for other crops, the cultivators being attracted by the larger profits derived from it. The best markets for Persian opium are London and Hong-Kong. Already it has competed with success against the opium of Turkey and Asia Minor, but it appears that the makers will have to learn to avoid the sin of adulteration, the best quality being, it is said, mixed with the inferior kinds grown in other parts of Persia. About one-fourth of the best is exported by European firms. A fair trade is also done in tobacco, which is also grown principally in and around Ispahan, and the demand has increased since the smoking of cigarettes has become the fashion. Most of the tobacco goes to Bagdad, Beyrout, and Aleppo.

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The following is a summary of Messrs. Wm. Jas. and Hy. Thompson's fortnightly Circular of Indian and Ceylon tea, dated London, 5th May, 1887 :—About 45,600 packages have been printed for sale during the fortnight, including 3,600 of reprinted tea, and 7,200 from Ceylon. The auctions have passed with a uniformly good tone, and the tendency of quotations for all the better grades has been favourable to sellers, especially for leafy teas between 10*d.* and 1*s.* 6*d.*, and Broken Pekoes between 9*d.* and 1*s.* 3*d.*; but the demand for inferior kinds of Dust, Fannings and Broken, is barely sufficient to keep prices steady, and closing rates are ¼*d.* to ½*d* lower than a fortnight ago. Ceylon teas are selling readily at rather better prices than were recently obtainable; the quality of late arrivals being mainly of a high character. The April figures prove to be satisfactory, the deliveries being 6,766,000lbs of Indian, and 657,000lbs. of Ceylon, out of total deliveries for home consumption of 14,550,000lbs., as compared with 5,385,000lbs. of Indian, and 316,000lbs. of Ceylon, in April last year, out of a total of 13,585,000lbs. delivered; the proportions being 42 per cent for April, 1886, and 51 per cent for April, 1887. The sales for the remainder of thes eason will be light, owing to the small supplies left in merchants' hands.

The following is the official summary of the reports on the state of the season and prospects of the crops, for the week ending 26th May, 1887.—Slight rain has fallen in parts of Madras, Mysore, Bengal, and Assam, and showers are reported from a few places in Bombay, the Punjab, and the Central Provinces. No report has been received from Burmah for the week under notice. *Kharif* operations are in active progress throughout Bombay, the Central Provinces, and Berar, and have commenced in some districts in the North-West Provinces and Oudh, and the Punjab. Sowings have begun in parts of Bombay and the Punjab. Agricultural prospects in Madras Mysore and Coorg continue satisfactory. The early rice is coming up well in Bengal, and Assam, but rain is generally wanted in the former province. Sugarcane is under cultivation in Bengal, Assam, the North-West Provinces and Oudh, the Central Provinces and Rajpootana. Indigo in Bengal needs rain; in the North-West Provinces and Oudh the crop is being irrigated. Cholera has diminished in Bengal, but is prevalent in a sporadic type in several districts of the North-West Provinces and Oudh. Elsewhere the public health is generally good. Cattle-disease is increasing in Madras and prevails in Bombay. Prices are rising in three districts of the Punjab, and have slightly risen in Mysore and Coorg Elsewhere they are steady.

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Among the important matters discussed at the recent Annual General Meeting of the Chamber of Commerce, was the silk trade of India. The President in his address, said :—"It is satisfactory to note that the Government have taken up the question of the decline in the silk industry. The very serious falling off in the production of silk has been the subject of enquiry during the past year. It seems to be agreed that the principal cause is disease among the worms. How far this disease is the result of wrong management, or of improper or insufficient food, is yet to be ascertained. It is hoped that the Government will adopt the recommendations of the Conference held in Calcutta, on the 18th March last, and engage an expert in France or Italy, who has had practical experience in M. Pasteur's treatment of diseased silk-worms, to come out to India for a term to investigate the causes which have led to this disease, and to explain the treatment necessary for its eradication. In matters of this kind, the Agricultural Department have much useful work before them. No doubt, the experiments they are making with different and better qualities of seeds, and with improved modes of cultivation, and with manures, are very valuable. But there is room also for investigation into after processes, in which it is possible that ignorance of scientific methods, and want of time and means for trying experiments on the part of the first manufacturers, lead to considerable waste and loss. Any measures which tend to develop or to improve local industries will be welcomed by all interested in the welfare of the country."

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The following Resolution has been recorded by the Government of Bombay on the report of the horse shows at Shikarpore in Sind :—The Governor in Council considers that this report is very satisfactory. Though more than 900 animals had previously been rejected by an elimination committee, with the object of confining the show to carefully selected ones, the number exhibited was no less than 936. Owing to the popularity of the show some difficulty is experienced in keeping it from getting so large as to be unmanageble, and the Commissioner in Sind has accordingly suggested that in future the prizes should be strictly confined to horses, ponies, mules and cattle His proposal is approved. The animals exhibited, more especially the mules, were of a good class. It was unfortunate that no representative of the remount committee could be present The fact that many animals suitable for remounts were exhibited should be brought to the notice of the Director-General of Remounts who should be invited to arrange if possible for the show to be visited next year by officers with commission to purchase on behalf of Government. The exhibition of agricultural machinery, though it may with advantage take place at the same time as the Horse Show, should, as suggested by the Commissioner in Sind, be kept quite distinct from it His Excellency the Governor in Council is glad to notice the

subscriptions in the province reached a sum of Rs. 3,890. The amount to be assigned in prizes must depend upon local subscriptions and be left to the judgment of the Committee, Government are at present unable to promise more than Rs. 1,000. The commendation of Government is due to the Judges, the Managing Committee and particularly to Major Mayhew, Collector of Shikarpore, for their efforts to make the show a success.

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We were somewhat astonished to read in one of our local dailies, that an action had been brought in the High Court to restrain Messrs. Thompson and Mylne, the patentees of the famous "Behea" Sugar mills, from laying any claims to the exclusive privilege of manufacturing the same. The report, of the case is as follows—

On the 22nd May, Mr. Allan applied, on behalf of his client, Mr. David H. R. Moses, for a rule calling on Messrs. Thompson and Mylne, the patentees of certain sugar mills, to show cause why the patent taken out by them should not be declared null and void. Some time in 1873, Messrs. Walter Thompson and James Mylne applied for and obtained a patent for the exclusive privilege of manufacturing a certain description of sugar mill. Mr. Allen contended they were not entitled to this exclusive right, inasmuch as the mill was in existence, and was used for years before the present patent was granted. In 1855 an exactly similar mill was used in America and was imported into this country in 1857. It was very difficult to state who were the original inventors of the mill, but it was one of very considerable antiquity, and the mill was probably known to, and used by the ancient Egyptains. Mr. Allen's application was supported by a mass of affidavits and professional opinions, proving that the mill was used long before 1873. Messrs. Burn and Co. were actually making them in 1869, 1870, and 1872, from working designs showing how the machine was made, and which also show that the public were in possession of a complete knowledge of the machine long before these gentlemen applied for the patent. This being the case, Mr. Allen took it that as the patent did not protect anything new—the patent law was clear on this point—and the patent should be declared void. The petition was put on the file in 1873, giving such information that any ordinary mechanic could make a similar machine, and this was sufficient to invalidate the patent. The affidavits spoke to the fact of this very mill having been made and hired out to one Rugoonath Singh in 1869 and 1870. And as to the antiquity of the invention, Mr. Allen produced, and put in as evidence, a book sold to a Calcutta library in 1857, by Messrs. Thacker, Spink and Company, in which appeared an illustration of a mill, by comparing which with the specification attached to the petition, the Court would see that they were identical, except as regard the legs, which were shown as horizontal, but the reason of this was fully explained in the affidavits. The court, after examining the book, granted the issue of the rule on the grounds of the petition.

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We were always under the impression that this particular mill was invented by Messrs. Thompson and Mylne to suit the special requirements of the Indian cultivator. The patentees have enjoyed the exclusive privilege of manufacturing the mill for many years now, and if Mr. Moses succeeds in his suit, it will be rather a heavy blow to Thompson and Mylne. But what business Mr. Moses has to question the right of the patentees, has not transpired. If the mill was "known to, and used by, the ancient Egyptians," it is not quite clear what connection Mr. Moses has with it, unless indeed he lived in the time of the "ancient Egyptians." The case altogether presents some novel features.

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Captain Fred. Pogson, of Kotegurh, recommends the following speedy and effectual methods for the destruction of rats:—"To exterminate rats is by no means a difficult operation, and may be most successfully done by—1st, a simple substance which is a deadly poison only to rats, who partake of it; and 2nd, by introducing "sulphuretted hydrogen gas," into their holes. Cats, as we all know, are attracted by "Valerian." and rats by the oil of "rhodium." By means of a few drops of this oil, numbers of rats can be drawn to any particular locality, where the tasty poison being placed, they eat and die on the spot. To make this Rat Poison, take of squill, in powder, 2 ounces; of cheese of any sort, powdered, 8 ounces; mix the two intimately together, and the result is the Rat poison, and is said to kill rats instanter. The "Squilla Maritima," is the variety recommended, though perhaps Indian squill might answer as well. The cheese can be made by curdling fresh milk, with or without rennet. As regards the sulphuretted hydrogen gas, its preparation is given in all chemical works, and it can be filled into bottles or bladders, and the gas on being poured into a rat hole will instantly pervade space, and kill every rat in the hole. The cost of preparation is a mere trifle. This plan will kill rabbits as well, and has been placed before the Governments of Australia for trial, as likely to be more effectual than wire fencing one hundred miles long, to keep the rabbits of one State from migrating into another. See map of Australia for such boundaries."

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The "Conferences" in connection with the Colonial and Indian Exhibition last year do not appear to have been productive of much good, if we are to believe what a usually well-informed English exhange says of them:—"When, in June last, the Colonial and Indian Exhibition was at its height, a series of 'Conferences' on the produce of our Indian dependencies was held in the imperial Court of the Indian section, with the object, it is believed, of spreading information concerning such articles as are little known in this country, but which might possibly be utilised in pharmacy, dyeing, perfumery, the textile industries, or for other purposes. The class of traders to whose interests the conferences ought to have been devoted is a very large one, and some tangible benefits might have accrued from the meetings, if the guiding minds of the exhibition had shown an ordinary amount of common-sense, by calling proper attention to the conferences and endeavouring to obtain the largest possible attendance of scientists and traders. But the gentlemen who "bossed" the South Kensington Show were anxious, above all things, to keep representatives of the press away from their doings; nor did they seem concerned to secure the attendance at the conferences of commercial men, save a very few personal acquaintances, and thus a unique opportunity of benefiting both Indian producers and British traders was wilfully thrown away. Altogether fourteen conferences were held, the average attendance being eleven, and the number of persons present in no instance exceeding seventeen, including those attending *ex officio*. The majority of those present were gentlemen more or less directly connected with science. At the conference on drugs and medicinal raw products, for instance, Sir E. C. Buck and Dr. Watt represented the official element. Professor Dunstan, Drs. Cooke and Jones and Messrs. Howard, Cartrige, Holmes, and Jackson, the scientists; while the commercial element numbered only seven attendants, including Messrs. Umney (Wright, Layman & Umney), Ekin (Savory & Moore), and Gale (J. Bell & Co). Mincing Lane was represented at some of the conferences by one or two produce brokers. Wisely managed, the conferences might have been productive of a solid gain to the commercial community; but, thanks to the hole-and-corner spirit in which the officials chose to conduct them, they have resulted in nothing except the production of a thin and most carelessly edited report, issued at the national expense nine months after the close of the abortive proceedings."

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The report dealing with the condition and outturn of crops in the Madras Presidency, up to the 1st April 1887, states that the area cultivated with sugar-cane in the twelve months ending March 1887, was 45,370 acres, against 48,770 in the preceding year, and 45,600 in the five years ending 1884 85. In the district of Vizagapatam the cultivation fell by 5 600 and 1,080, acres, respectively, as compared with the average of five years preceding The figures for 1885 86 reported by the collector apparently include cultivation in zemindaries. In North Arcot there was an increase of 1,970 acres over the average of five years ending 1884-85, but a decrease of 380 acres compared with 1885-86. Sugar-cane is cultivated to a large extent in nine districts, in the following order:—Bellary, Godavari, North and South Arcot, Trichinopoly, Ganjam, Coimbatore, Cuddapah and Vizagapatam. The outturn was good; only 28 per cent being middling and 7 per cent. bad. The total yield was about 61,000 tons. The cultivation of cotton

is chiefly confined to the ceded Districts and Kurnool, and portion of Kistna on the one side, and Coimbatore, Trichinopoly, Madura, and Tinnevelly, on the other. A very large portion of the crop has already been harvested, and the present return relates to the crop remaining on about a third of the total area cultivated. The condition of this crop is not encouraging, as only 22 per cent. of the area is estimated to be likely to yield a full or average outturn, and over 42 per cent. to be middling. The total outturn on 336,300 acres is estimated at about 86,000 Indian maunds, or 3,100 tons. The question of altering the date of the condition report on cotton to 10th February, is now before the Government of India.

Indigo is chiefly grown in the seven districts of Kistna, Nellore, Cuddapah, Kurnool, Chingleput, North and South Arcot. The early crop occupied about 331,000 acres and was harvested by the end of December 1886. The late crop cultivated between September and February and dealt with in the present return, occupied only 20,000 acres distributed over six districts. Its condition was not satisfactory, 45 per cent of the total area being estimated to be likely to yield a four-anna crop, and only a quarter of the area a full or average crop. The probable outturn on the total area is about 3,200 Indian maunds, or 2,360 cwts. of manufactured indigo.

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THE statement regarding the outturn of paddy, cholum and ragi, deals with the outturn during the three months ending March 1887. They are intended to show the outturn of the *late* crops, as distinguished from the *early* crops, harvested by the end of December 1886, but the distinction is not clearly noted in the returns now submitted. The subjoined statement compares the area harvested in the two periods :—

	April—December, 1886.	January—March, 1887.
	acre.	acre.
Paddy ...	... 2,408,600	2,803 100
Cholum ...	... 1,939,000	1,423,800
Ragi ...	... 945,500	311,900

The outturn of the crops during the latter period was, as under :—

—	Paddy	Cholum	Ragi.
Bumper, per cent ...	8 7	4·9	5 1
Average do. ...	36·4	38·3	33·1
Middling do. ...	38·5	32 2	45·2
Bad do. ...	16·4	24·6	16 2
Outturn in tons ...	1,252,000	195,000	150,000

On the whole the yield was fair. The outturn of castor and lamp-oil, and gingelly-oil seeds, in January to March 1887 was fair in the case of the former, and poor in the case of the latter. The average production per acre has not yet been ascertained, and the total yield cannot therefore be stated. The area under castor oil seeds was 550,700 acres, and that under gingelly 46,300 acres.

GERMINATION OF *BABOOL* SEEDS.

A SOMEWHAT interesting controversy is going on in the columns of our contemporary, the *Indian Forester*, on the subject of this article. The point at issue is, whether *babool* seeds are actually passed through the stomach of goats, and are thus rendered more easy of germination. The interest of the question lies in the fact that, if this is really so, it would be of material advantage to allow goats to graze and obtain *babool* pods for a limited time in forest reserves where this tree is plentiful, and then to fold them at night in another part of the reserve where the ground is absolutely bare of any vegetation ; so that in course of time there would spring up spontaneously, so to speak, a forest of *babool* trees without entailing any labour or expense.

The *babool* (*Acacia Arabica*) is about as common a tree as can be found in this country, and certainly does not seem to us to require any special treatment to raise it from seed. But the question has been raised and discussed. General Van Someren, in the February number of the *Forester*, questioned in particular the theory put forward by another correspondent that the germinating power of the *babool* seed is improved by being passed through goats ; and generally, whether seed of any kind is so benefited by being passed through birds.

One writer in the April number of our contemporary reported an experiment carried out by him in the Sholapore district of the Deccan, in February 1886 ; and on the spot where the goats thus fed were folded, a fair crop of seedlings has since sprung up. He added, however, that in the opinion of the Range forest officer of the *talook* where the experiment was carried out, most of the seedlings had sprung from seeds fallen, or *ejected from the animals' mouths ;* but that *some* of the seeds had undoubtedly passed through the stomach of the animals, and been voided in their droppings. Another correspondent, in the current number of the *Forester*, writes as follows :—

"As regards *babool* 'G. J. v S.', is perfectly correct in his surmise, that the seeds are not passed from the mouth to the anus of goats. *babool* seeds seldom or never do pass completely through the goat, though they do through individuals of the bovine species. What happens in the case of the goat is this—the whole pod, seed and all, is eaten and goes into the first stomach, then follows fermentation, which often, if not always, precedes the hour of rumination. Rumination as a rule takes place where the animals are herded, *i.e.*, where their dung is collected. Here, if anyone will take the trouble to watch a goat, he will see it, during the process of ruminating, spitting out the seeds, which naturally fall amongst the dung and get swept up and stacked with it by the shepherds. "G. J. v S." now infers that the benefit the seed attains, *viz.*, that of being able to germinate quicker than ordinary seed, is due to the place where it falls. Here I take objection, and would ask him to try the experiment of placing a few ordinary *babool* seeds in a similar situation, and he would find that a very large percentage would not germinate at all, until the usual course of two hot weathers had been passed over. Whereas, nearly every one of the quidded seeds would germinate in the first monsoon. It matters not how soon after quidding the *babool* seed is removed from the dung, it is always the same good germinator. I have heated, both in manure and water, *babool* seeds, and find that by gentle heating it often happens that you can get seeds to germinate at once, but being an operation in which the temperature may by accident be carried too far, or not far enough, failure to germinate often ensues. Whereas this cannot take place in the stomach of the goat ; this is a process that can never be altered, and consequently never fails. With reference to birds, I know the case of the *Melia Azedarachta*, the seeds collected by me specially for plantations where those which bore unmistakable signs of having been through a bird's stomach, and as in the case of the *babool*, so in those of this seed, no comparison as a rapid germinator could be found between it and any other fermented or non fermented seed of this same species."

A third correspondent of our contemparary does not at all see the necessity of passing *babool* seeds through goats, to increase their germinating power. His says :—"Having seen an article in the *Indian Forester* for April 1887, headed 'Germination of *Babul* Seeds,' I beg to say that if it be purely for the sake of germinating of seed that it should be necessary to pass through goats, it may be avoided, as it can be effected more efficaciously if the seed be steeped over-night in fresh cowdung mixed with water of equal weight and sown broadcast the next morning. This will have the desired effect, and is a procedure practised by the Bengalees in Lower Bengal, which I have seen, but never tried myself, not having the occasion."

Here we have a solution of the whole question. The object in view is to soften the outer shell of the seed before sowing, as in the case of many other leguminous seeds. A correspondent of some experience, writes to us on the subject as follows :—" Some years ago I undertook the raising of many varieties of the beautiful Australian acacias, the seeds of which I had imported. My object was to ascertain whether these could be naturalised in this country. Knowing full well that to get a crop of seedlings at an early date, the outer shell of the seeds must be softened, I steeped the entire lot in a mixture of fresh cow-dung and water—previously heated—for 24 hours. Having prepared my beds, I sowed the seeds (in the beginning of July) and fully 90 per cent germinated within three weeks. I have since raised hundreds of acacia seedlings—the common *babool* among them,—and never found any difficulty about the matter. This is the native method of sowing the seed, and is as good as any that I know of The

question discussed in the *Indian Forester*, as to the advantage of passing the seeds through goats to hasten germination, is so much time wasted. It appears to me that the writers do not understand the *theory* of seed-germination. A closer study by forest officers of the physiology of plant-life would result in some advantage to the service."

The foregoing is an extract from a letter sent to us by a gentleman of very wide botanical and horticultural experience, to whom we applied for information on the subject under consideration. If his experience is likely to be of any use to our forest officers, we shall not have written in vain. We hope, however, that those who adopt his method, will kindly communicate the result to us, or to our contemporary, the *Indian Forester*, for general information.

TEA PLANTING.

The *Young Tea-Planter's Companion** is a useful little book that has been written with a double purpose. It is intended to serve as a *vade mecum* to young men who propose to go into tea-planting in Assam, and may also be of use to planters, who have served their time as supernumerary assistants, or who have suddenly been advanced to the charge of a garden. 'During the time a young planter is a supernumerary assistant,' says the author, 'he has little chance of learning all the details of accounts, and the system of working out estimates, &c., since his experiences during that period are usually nothing much beyond the practical working of a garden, and he may therefore be glad of a text-book, such as is here offered for his assistance, to which he can refer if in doubt about any special point regarding his work.' The book may be described as a kind of rough planter's diary. It tells him, month by month, what he ought to do. In January, for instance, there is the pruning to be finished, the building and transplanting to be done. In February manuring, trenching, deep-hoeing, sau-tree sowing, draining, repairing of roads and bridges, collecting of fire-wood, etc., etc. Throughout, the hints which are given in 'a suggestive not a dictatorial manner,' appear to us thoroughly practical and thoroughly sensible. We pick out one bit of advice which the author gives regarding the plucking of leaves, as a specimen of his style and manner. In April (p. 15) he says, "plucking leaf may usually be commenced about the first day of this month, and therefore it may be said that the 'tea season' begins on that date, and ends entirely by the first week, or at most ten days into December. Not over twenty-five women should be put on to pluck for the first few days, the most reliable sirdar over women employed in the garden being put on to supervise and instruct them, and he must pick out the best pluckers amongst the women, to start this most delicate work, as a garden may be easily spolled, at least for a time, if handled roughly when first plucked. Each of these women should be given one measure, three feet long, with strict injunctions not to pluck any tree under that standard, leaving any unhealthy-looking trees, and young plants entirely alone, and she should pluck merely a top and half a leaf. This is called tipping, and must not be exceeded until the time when the manager has himself observed that the tea shoots have got sufficient start to bear hard treatment."

The second part of the book contains a series of tables of weights and measures, of land measure in England and in Assam, of forms for keeping accounts. The forms are, as far as we can judge, very complete, and contain statements in different columns of the amount of land held, expressed in *Hasiras* and *Ticcas*, of the coolies employed, of the work done, of wages, of general expenditure and others. Then follow building estimates. And appended are a number of excellently drawn plans, which give one a good idea of how a factory and manager's office, a bungalow, a *kutcha* coolies' house, and others should be built. Altogether we do not doubt that the book will serve its purpose admirably, and that the beginner, whether on his way out to India, or whether he is installed already in a garden in Assam, could not do better than carefully look through this compendium.

A CORRESPONDENT, signing himself 'J. W. D.,' sends to the *Tropical Agriculturist*) Vol. VI. No. 11, May 1887) as an *original* contribution, a paper by Mr. F. W. Cabaniss, Assistant Director of Agriculture, Burmah, on the black grain weevil, and how to destroy it. The same paper was published by us in our issue of January 22, 1887.

* *The Young Tea-Planter's Companion*, a Practical Treatise on the Management of a Tea-garden in Assam. By F. T. R. Deas. London: Swan, Sonnenschein, Lowrey and Co.; 1886.

DATES IN JEYPORE.

Dr. E. Bonavia has addressed the following letter from England, dated January 18th, 1887, to Lieutenant-Colonel Jacob, Executive Engineer, Jeypore, regarding the cultivation of the Arabian Date-palm in that State:—

I am extremely glad to learn that the Durbar have sanctioned half-a-ton of date-palm seeds. Your plan is a good one, that is, offering an inducement to the people for growing and taking care of them. You will have been a great benefactor to the Jeypore State. You should, however, I think, keep a nursery under your own eyes. Seeing is believing, and natives are slow in believing and caring about results they have *never* seen. Like children, things must be done for them until they taste the advantages, and then no one is quicker in taking up a thing. As to procuring the seed, there are many ways. Either by applying to the Government of India, and they will get seed through the Persian Gulf Resident. They have lately sent ten maunds of seeds, and 230 offsets of four of the prime varieties to the Central Indian Agency, and a similar amount to the Punjab Government. Offsets should reach you in October, while seeds need not reach you till February, and this will give more time for collecting the seed. Seed is not utilized in the Gulf, as they have innumerable ready-made off-sets of the *best and most valuable varieties*. So that, in the Gulf they have some difficulty in sending seeds without due notice. Write now and get what you can through Government. Then you might write to the Political Resident, Persian Gulf, at Bushire direct, and also to Messrs. Gray, Mackenzie and Co., Busrah, for seed. The kinds most valued in the Persian Gulf are "Hallowi," Khudrawi, "Zahdi," and Samran." The latter, a hardy tree with excellent fruit.

Hallowi, exported to Europe, are the most highly-priced and esteemed, because of flavor, and "because they do not get wormy when packed in boxes;" and Zahdi fetches the highest price in Bombay. Then Mr. Duthie, of Saharanpore, may be able to help you with imported seeds. He has undertaken large plantations of nurseries of date trees of all sorts and from all countries. Then Mr. Ridley of the Horticultural Gardens, Lucknow, may be able to help you with seeds of his acclimatised varieties, both of off-sets and of seedlings. He can send you the fruit before it ripens or as it is ripening. Before fully ripe the seeds germinate equally well. Seed sown in winter may not germinate till February, and that sown in February will germinate in a fortnight or so.

Further, at the suggestion of the Director at Kews, I wrote to Sir R. Lambert Playfair, H. B. Majesty's Consul-General, Algiers, and explained to him our Indian wants, as they thought there were great difficulties in sending seeds and off-sets from the south of Algeria; they have saline oases where date trees are grown and nothing but date trees thrive in that soil. I heard from Sir Lambert yesterday. Hear what he says: "I only returned from the Djerid (in Tunis) a few weeks ago. I superintended the selection of the date seeds in person, and am about to return to Tunis in a few days." The seeds have been sent to the Government of India. Apply for a portion of them. The Djerid variety of dates is said to be the finest in the world. He adds: "Really there is no necessity of sending offsets, although, from what you say, there would be no difficulty. Seeds are sure to germinate, and the experience of the Arabs here (Algiers) is that the fruit of seedlings is quite as good as that of trees propagated by suckers. The only difficulty is that seeds give a larger proportion of males than *needed*." Please note the above underlined word. Never believe what they say in the Persian Gulf about seeds. Seedlings in Oudh have produced fruit equal to suckers! I sent a fine collection of date fruits from seedlings to Kew just before leaving India. In the Persian Gulf, they despise seeds because they don't need them. In the same way that in India good mango stones are despised because they have any number of grafts of the best kinds. There in Egypt they have upwards of 50 varieties of dates. Some grow in dry places, others in damp, with a good deal of cultivation. As I crossed the Isthmus of Suez I saw date trees of which fruits had been recently gathered with their roots in water. Everywhere water was within one foot of the surface; the inundation apparently had just been receding. The best Egyptian date is a small one and is like sweetmeat. Write to any of the Egyptian Canal Officers (all of them Indian Canal Officers), or to the British Consul in Alexandria, or to any English Officer you may happen to know there—you cannot have too many varieties to begin with, and import a lot of seed every year. When the Persian Gulf people know that seeds of good dates are wanted, they will collect and keep them every season.

From September (ripening of crop) to January, they can collect you maunds of seed every year. The Director of Kew, writing to me recently, says: "I am sure the enterprise (introduction of date trees in India) you have undertaken is a sound one, and I have done my best to back you up. You have set the ball rolling, and it must now rest with the botanical officers in India (and others) to keep the game going." Sir Lambert Playfair is an old Indian officer, and a good gardener himself, and will help in the enterprise with great pleasure, so write to him. "Although" he says, "I have already sent off the first supply; *enough to plant half India*."

He however may have forgotten that India is overrun with goats and cattle which in dry seasons eat up everything they are allowed to, and natives are apt to leave everything too much to God. So, for the next 10 or 15 years pray never relax your efforts to *obtain seed* and to *plant*, and to protect. You will be the great benefactor of Jeypore. The thing is not to be done at once, but steady presever-

ing work is required and an indomitable *will* not be *beaten*. The thing is to be done without much trouble. In my opinion seed is the best for general use. *The more the males at first the better*. Until Natives understand the tree as they now understand the wheat-growing, then of themselves they will make plantations of off-sets of their best females only, and artificially fertilize with pollen of a comparatively *few* males. There is time enough for that. What is wanted now is to get the seed, sow it, nurse the plants, plant them out in plantations, and protect them till they are out of reach of harm. This is to be done every year until all spare land at Jeypore in every village is *filled*. The cultivated trees produce the best and finest fruits. Off-sets being expensive should, I think, be limited to nurseries and plantations at head-quarters. In the hot weather, they will be given frequent watering to grow rapidly. I hope you may also induce the other States of Rajpootana to follow your example. If you could lithograph this letter, you might circulate it among them *privately*. I think if the matter were taken up by the whole of Rajpootana, in 10 or 15 years, that tract of country would be a different country, and its saline cases are favourable to date-tree growing.

There is another plant which I wish now to recommend *strongly* to your notice and care, namely, the *European Prickly-Pear tree* (a Cactus) You have hedges of the wild varieties. Nurseries of the latter might be made and European varieties grafted on the wild ones. It grafts with the greatest ease, and might also be raised on its *own* roots, like the wild ones, with a certain amount of care. For rough rocky soil, where water can be given to the trees, round tanks, &c., the cultivated variety produces admirable and delicious fruits. In Malta, the best varieties are to be had—to be obtained through Government. They are usually grown in *private* gardens, *viz.*, the *white*, *red* and *yellow* fruited varieties. But it is grown largely in Egypt, Sicily, South of Italy and in Spain, and probably all along the Mediterranean. Some time ago, I *urged* the Madras Government to give it a trial. They have done so, and introduced it into Bangalore and other places. In South India, the wild prickly pear grows everywhere, and hedges are made of it; it bears a small red and rather tasteless fruit which natives eat. Mr. Steavenson, the Honorary Secretary, Agri-Horticultural Society, is very keen on *prickly pears*, and may send you some of his imported kinds; also superintendent Mysore Government Botanical Gardens, Bangalore; also any English official in Egypt. The cuttings are bat-like pieces of the stem and should reach you in October after the rains, as too much before rooting might rot the soft cactus substance. But perhaps, in Jeypore, where you may not have much rain the rainy season would be preferable. Try to get them *now*, in the rains, and also *after* the rains. Your Jeypore stoney soil with a little digging, manuring and watering, to give the prickly-pear trees a start, might prove admiraby suited to this plant. Udaipore and Ajmere, besides Jeypore, have taken date off-sets also from Saharanpore You can get seeds of good Mooltan dates and also of Sindh dates from Karachi.

WHEAT AND LINSEED CROPS IN THE CENTRAL PROVINCES.

The following is the final report on the prospects of the above crops, as furnished to us by the Revenue and Agricultural Department of the Government of India :—

"In regard to the statistics of area it must be observed that, owing to the pregress of operations for re-settlement, over a considerable portion of the provinces, it has been impossible to make them as accurate as could be wished, since a large portion of the *patwaris'* time has been occupied in surveying, and in writing the record-of-rights. The figures given for the Raipoor and Bilaspore districts are mere estimates, as the records of the last settlement have never been corrected, and it will be impossible to give statistics of present area till the re-survey now in progress has been completed. Survey work has also been in progress in the Saugor, Damoh, Jubbulpore, and Nursingpore districts, and a large proportion of the *patwaris* have had no leisure to make the careful field-to-field visitation of their villages, on which the correctness of their area returns depends. The great differences which are to be observed between one district and another in regard to the area on which wheat was grown, compared with the area of the preceding year, are due to the abnormal and capricious character of the October rain-fall, which in some places favoured an extension of wheat sowing, whilst in others it necessitated a large contraction, Taking the Provinces as a whole, the area appears to be slightly larger than that of the preceding year, but it is believed that if figures for Raipore and Belaspore were available, a considerable excess would be shown, as the area under wheat in those districts is known to have increased very greatly. The contraction in the area under linseed is very striking, amounting to no less than 20 per cent. The greater part of the linseed crop was sown before the occurrence of the heavy rain in October, which proved most destructive to it. A large proportion of the area was ploughed up and re-sown with wheat. Regarding the out-turn there is not much to add to what was stated in the former report. The wheat has turned out rather worse than was anticipated in the north of the Provinces, where the damage done by frost was more extensive than had been believed, and rather better than was anticipated in the Nagpore country. The linseed crop was reported to be a very bad one, but it has proved even worse than was reported, and in many districts the out-turn will be merely nominal."

Statement showing the areas under Wheat and Linseed in each District of the Central Provinces during the Rabi *season of 1887, with the estimated out-turn in annas per rupee.*

WHEAT.

Name of district.	(a) Area of current season.	Excess (+) or deficiency (−) compared with area of last season.	Estimated outturn in annas per rupee.
	Acres.	Acres.	
Saugor	574,816	+45,538	10
Damoh	207 969	−33,680	10
Jubbulpore	481 200	−4,976	10
Mandla	92,056	+9,548	10
Seoni (b)	298,000	+6,000	12
Nursingpore	220 613	−28,999	14
Hoshungabad	631,3?4	−31,504	14
Niwar	39,786	+9 242	11
Betul	175,[illegible]	−22,017	12
Chindwara (b)	178,000	−11,000	12
Wardha (b)	297,600	+8 000	16
Nagpore	372,201	+40,791	15
Chanda	80,665	+821	15
Bhundara	127,556	+11,184	10
Balaghat	21 183	+1,421	10
Raipore (c)	350,000	(d)	12
Bilaspore (c)	150,030	(d)	12
	4,297,949	+364	......

LINSEED.

Name of district.	Area of current season.	(a) Excess (+) or deficiency (−) compared with area of last season.	Estimated out-turn in annas per rupee.
	Acres.	Acres.	
Saugor ...	37,282	(d)—8,174	3
Damoh ...	34,483	—15,538	3
Jubbulpore ...	74,973	+14 972	2
Mandla ...	12,110	+2,781	1
Seoni (b) ...	17,030	+2,300	5
Nursingpore ...	10,019	—1,551	1
Hoshungabad ...	26 329	—9 385	3
Niwar ...	8,289	—2,155	2
Betul ...	3,[illegible]0	—984	8
Chindwara (b) ...	13,200	—700	10
Wardha (b) ...	129,0[illegible]0	—32,000	12
Nagpore ...	82,257	—96,349	6
Chanda ...	67,814	—28,289	8
Bhundara ...	29,376	—29,479	4
Balaghat ...	11,298	—8,726	5
Raipore (c) ...	(b) 194 000	(d)	8
Bilaspore (c) ...	(b) 60,000	(d)	8
Total ...	810,760	—213,277	...

(*a*) The area of last season is taken as returned in the agricultural report for the year, and not as stated in last season's final fore-cast, the figures in which needed correction.

(*b*) An estimate only, as no district report has been received.

(*c*) Figures are mere approximations, as no statistics are available, the districts being under settlement.

(*d*) No information available.

WHEAT AND OIL-SEED CROPS, NORTH-WESTERN PROVINCES AND OUDH.

The following is the final report on the prospects of the above crops, as furnished to us by the Revenue and Agricultural Department of the Government of India ;—

" As in previous years, this forecast is largely based on monthly bulletins received from the zemindars, in correspondence with the Agricultural Department, Over 300 reports were received for April, each dealing with a separate portion of the country,

"*Character of the Season.*—The rains ceased, to all appearance, early in September, *viz.*, from about the 1st, in the Meerut, Agra and Jhansi Divisions, and from the middle of September in the Rohilkhand and Allahabad Divisions, and in Oudh. In the Benares Division alone rain fell lightly throughout the month. Early in October the rains commenced again ; and in Allahabad, Benares, and parts of the Jhansi Division and in Oudh the rain-fall was heavy ; while in the Meerut and Agra Divisions it was light. The early cessation of the September rains had led in most places to the soil caking, consequently the October rains helped greatly the sowings. Between the 10th and 12th of December, there was heavy local rain in Bundelkhand, and in parts of the Allahabad and of the Rai Bareilli Divisions. Early in January, the regular winter rains set in all over the country, commencing with the Meerut Division, and progressing gradually towards the east. These showers were copious and did much good; but the number of cloudy days was unusually large, favoring fungoid diseases, which affected both wheat and rape-seed. Towards the close of January and beginning of February the thermometer ranged very low, with the result that serious damage resulted from frost to wheat, oil-seeds, wheat, gram, and arhar. Of the latter crop over one-third is reported to have been destroyed

The early part of March was exceptionally dry and free from clouds, but towards the close of the month there were numerous thunder, and hail storms. The districts of Bareilly, Badaon, Farakhabad, Etawah, Sitapore, Hardoi, Oonao, Sultanpore, Partabgarh, Fyzabad and Gonda were those that suffered most from hail.

Area.—The rain in October was generally well distributed and the November reports from Oudh, and from the Allahabad and Benares Divisions, disclosed an increase in area both under wheat and oil-seeds, which would, it was hoped, more than compensate for the deficiencies reported from the Meerut, Agra, and Rohilkhand Divisions; but, in the end, in regard to wheat and rape-seed, such proved not to be the case, and the total area under those crops falls considerably short of the area in the preceding year. If 100 be taken to represent the area of the preceding year, then the area under wheat, rape-seed and linseed during the present year may be indicated by 95, 97, and 120, respectively. The total areas under wheat and oil-seeds during 1887 and 1886, are shown, division by division, in the following table:—

Division.	Area of pure wheat forecasted in—		Rape-seed.				Linseed.			
			Sown alone.		Sown with other crops.		Sown alone.		Sown with other crop.	
	1886.	1887.	1886.	1887.	1886.	1887	1886.	1887.	1886.	1887
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Meerut ...	1,189,974	1,107,835	9,652	6 073	1 936 471	1,602,525	1 941	1 474	33,574	28 993
Rohilkhand ...	1,076,811	985,980	13,443	12,636	1,312,095	1,380,580	20,271	32,633	321 595	407,017
Agra ...	526,223	445,714	4,559	2 674	1,779 066	1,559,512	977	93	68 215	45,632
Allahabad ...	191 598	214,780	687	1,230	1,382,665	1,369 095	83,285	91,703	895,049	1,081,867
Benares ...	564,590	569,104	29 014	34,277	603,725	838 087	188,097	191 676	531,512	841,400
Jhansi ...	85,103	77,208	554	257	8 837	29 312	15,046	10,541	75 352	72,924
Tarai (district) ...	52,130	48,717	7,508	7,749	2,528	2 368	7,128	8,423	7,877	6,086
Total N.W. Provinces.	3,686,339	3,419,338	65,417	64,896	7,025,357	6 781,479	314,745	336,544	1,933 174	2,483,909
Lucknow ...	297,034	301,503	349	273	773,192	706,229	9 029	8,157	338 312	385,548
Sitapore ...	464,103	442 477	18 541	14 756	887,596	903 090	37,543	28,201	433,807	445,289
Fyzabad ...	571,736	566,386	98 802	81,193	577 424	607,711	98,327	116 118	418,804	480 324
Rai Bareli ...	221,169	233,238	74	112	683,729	693,359	6,517	10 653	222,080	310,378
Total Oudh	1,554,042	1,543,604	117 757	96,364	2,921,941	2 910,419	151,416	163,129	1,413,003	1,621,539
Total N.-W. P. and Oudh ...	5,240,381	4,962,942	183,174	161,260	9,947,329	9,691,898	466,161	499 673	3,346,177	4,105,448

Condition.—Collating the information contained in the final reports received from Zemindars, it is found that if 100 be taken to represent full average condition, the condition of these may be stated as follows:—

Percentage		Crops Wheat.	Rapeseed.	Linseed.
		Acres.	Acres.	Acres.
At 84	...	... 300,282	714 598	345,267
„ 75	...	... 551,062	459,557	1,408,483
„ 66	...	... 2 091,584	950 723	1,685 362
„ 50	...	... 1,147,234	6,904,429	1,166,009
„ 33	...	... 272,680	...	...
„ 25	...	... ...	763 851	...

Or if 100 be taken to represent the condition of the crops for last year, the condition of the present wheat crop may be expressed by 90, that of rape seed by 73, and that of linseed by 97.

Outturn.—Working on the standards adopted last year, the outturn of the present year's crop, governed by the estimates framed in the preceding paragraph, amounts to—

Wheat	... 1,732,050 tons, or	6 per cent. less than in 1886	
Rape-seed ...	397,600 „ „ over 30	„ „	„
Linseed ...	182,280 „ „ 14	„ more	„

Prospect.—Wheat.—The prospects of the wheat trade appear less favourable for 1887 than they were for 1886, and consequently far less than they were for 1885—

(1) In the first place the total estimated out-turn, as arrived at in the preceding paragraph, is less by 6 per cent. than the out-turn for 1886.

(2) Stocks have been drained to the lowest ebb.

(3) The crops of the other food-grains have also been inferior to those of the previous year, hence a greater demand for wheat for local consumption.

The following table shows the prices of barley, gram and *arhar dal* for every division during 1886 and 1887:—

Price per Rupee, in Seers.

Division.			Barley		Gram.		Arhar dal.	
			1886.	1887.	1886.	1887.	1886	1887.
			Srs	Srs.	Srs	Srs.	Srs.	Srs.
Meerut	...	...	31	26	28	24	25	20
Rohilkhand	...	...	33	29	27	24	27	27
Agra	...	..	28	24	28	24	27	22
Allahabad	...	...	27	26	30	29	29	26
Benares	...	...	29	25	25	27	24	22
Jhansi	...	...	28	26	30	29	24	27
Tarai district	...	...	31	30	22	21	28	25
Lucknow	...	...	29	25	29	25	26	23
Sitapore	...	...	36	29	30	27	30	24
Fyzabad	...	...	34	32	30	29	27	27
Rai Bareilli	...	...	34	26	30	27	26	25

(4) The local prices of wheat at every station are much higher than in the previous year, as shown below:—

Prices per Maund of 82lbs.

Station.		White wheat. 1886.	1887.	Red wheat. 1886	1887
		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Saharanpore	...	2 1 3	2 7 9	2 0 0	2 5 0
Muzaffarnagar	.	2 0 0	2 5 9	1 14 6	2 3 6
Meerut	...	2 1 8 / 2 0 10	2 5 9	2 0 0 / 1 14 6	2 3 6
Aligarh	...	1 15 8 / 1 15 3	2 3 3	1 14 6 / 1 14 3	2 0 9
Agra	..	2 3 7 / 2 1 8	2 10 8	2 1 8 / 2 0 0	2 8 0
Farukhabad	...	2 0 5 / 1 15 3	2 3 6	1 13 6	2 2 3
Cawnpore	...	2 0 10	2 7 1	1 15 7	2 5 4
Moradabad	...	2 2 2 / 2 1 0	2 7 5	1 15 6	2 4 0
Shahjehanpore	...	1 11 10	2 0 0	1 11 6	1 15 6
Hardoi	...	1 13 5	1 3 6	1 13 1	2 2 5
Lucknow	...	1 14 2	2 5 1	1 12 9	2 5 7½
Fyzabad	...	2 0 5	2 6 3	2 0 0 / 1 15 7	2 3 6
Bahraich	...	1 10 8	2 6 7	1 10 0	2 4 5
Gonda	...	1 11 3	...	1 10 8	2 2 7
Gorakhpore	.	1 15 6 / 1 15 0	2 5 5	1 13 6 / 1 12 6	2 3 6

(5) The London quotations for North-Western Provinces wheat are lower by nine-pence per quarter, the figures for the two years being as follows:—

			s.	d.
Price per Quarter in April, 1886	...	...	32	6
Ditto ditto 1887	...	...	31	9

Circumstances which appear favourable to trade for the present year, are—

(1). A lower rate of exchange;

(2). Lower sea freight, or £1-7 6, against £1-15 0 per ton in the previous year; equivalent to a saving of nearly 1 2/3rd shilling per quarter.

(3) The following reduction in railway freight effecting consignments of wheat booked from these provinces to the ports:—

(a) In consignments to Bombay, reduction of 3 pies per maund both *via* Bombay, Baroda, Central India and Great Indian Peninsular;

(b) In consignments to Calcutta reduction of 1·12 annas per maund on consignments booked to Calcutta *via* Ghaziabad, ·48 annas per maund *via* Aligarh, and 8 annas *via* Agra;

(c) Exemption from Hughli bridge toll of 1 92 pie per maund.

Rape seed.—The present prices of rape-seed are higher than prices were in 1886, and the quality very inferior. Demand from the ports appears to be slack at present.

Prices at the Cawnpore market on 30th April, are quoted below:—

Price per Maund of 82lbs

Variety			1886.	1887
			Rs. a. p.	Rs. a. p.
Yellow	...	...	... 3 0 9	3 4 0
Brown	...	...	... 2 8 0	2 11 0

Linseed.—Present prices of linseed are somewhat lower than last year. The quality appears good, especially in the case of the "bold" variety, from the *trans*-Jumna tracts, which suffered little from frost, and the prospects of trade appear supperior to either those of wheat or rape-seed.

Present prices at Cawnpore, which is still the chief collecting centre for linseed, are as follows :—

	1886	1887.
	Rs. a. p.	Rs. a. p.
Bold	3 14 0	3 7 6
Small	3 10 2	3 2 0

Miscellaneous Items.

The Government, while recently considering the question of the preservation of game, birds and animals in India, was of opinion that, while the necessity for the introduction of a general Game law had not been shown, it was desirable that authority should be accorded to the Provincial Governments to make rules, prohibiting the sale of certain classes of animals or birds within a specified cantonment or town during a specified season. In this view they have been upheld by the Secretary of State for India, who has agreed to the necessary legislation being proceeded with.

Dr. C. Keller, of Zurich, says the *American Grocer*, claims that spiders perform an important part in the preservation of forests by defending the trees against the depredations of aphides and, insects. He has examined a great many spiders, both in their viscera, and by feeding them in captivity, and has found them to be voracious destroyers of these pests, and he believes that the spiders in a particular forest do more effective work of this kind than all the insect-eating birds that inhabit it. He has verified his views by observations on coniferous trees, a few broad-leaved trees and apple trees.—The many thousands of spiders whose webs can be seen on dewy mornings, on tea bushes, are probably doing a good work.

The Melborne *Leader* says :—Australian vine-growers will be sorry to hear that another vine pest has appeared. This is known as the black rot, and is believed to have been brought into France from America, where it has wrought terrible havoc about the Missouri. It has now broken out in the department of the Herault, France. This disease appears first in a small red spot on the grape, and rapidly infects the entire cluster. The fruit then dries up completely. When the disease first attacks the foliage the spot is black. Vines growing in rather damp soil, or in regions liable to flooding by overflowing rivers, are most liable to this disorder. The American vines are the cause of this pest coming into France. It is not known exactly how to meet this new plague, but sulphur has been advised.

Chloroform has been found very efficient against tape worms, Doses of 30 grains have been given, repeated after twenty or thirty minutes, but troublesome cardiac symptoms may be avoided by giving smaller doses (a few drops every few minutes for a few times. Thompson successfully prescribed chloroform oz j. by weight, simple syrup to oz.j. to be given in three doses, at intervals of two hours, in the morning fasting, with castor oil to follow. An Italian physician recommends thymol as a remedy for tape worm. A dose of about half an ounce of castor oil is given in the evening when the patient should abstain from food, and take, next morning, two drachms of thymol, divided into twelve doses, one every quarter of an hour. About half an hour after the last dose has been given, a dose of cas'or oil should be administerd. This is usually followed by the expulsion of the dead worm. Thymol quickly depresses the pulse, respiration and temperature, and to obviate any ill-effects from this cause, frequent doses of brandy or spirits should be given at the same time. The advantages of thymol are said to be that it produces no disturbance of the stomach, is rapid in effect, is both a taenicide, and a taenifuges, and while certain in action, will do no great harm if an error in diagnosis has been made.

Selections.

CORN—VARIETIES AND CULTURE.

[*Abstract of portion of an address by Proof, G. E. Morrow.*]

Indian corn is the chief grain crop of the United States and of Illinois. The crop of 1886, greatly lessened by drought, is estimated at 1,665.000,000 bushels on 75,000,000 acres for the United States, and 209,000 000 bushels on over 8,500,000 acres for Illinois. Central Illinois is in the greatest corn belt of the world.

The plant is adapted to wide variation in soil and climate but does best on rich soil and with warm and rather dry summers. It varies wonderfully in stalk, ear, kernel and time required to come to maturity. There are six species—Dent, Flint, Sweet, Pop, Flour or Tuscorora, and the little known Husk or Pod corn. Dent Corn is almost exclusively grown as the field corn of the west. There are very many varieties, with much confusion as to names. The different species readily cross fertilize, and it is more difficult to keep varieties pure than to produce crosses. There is a marked tendency in varieties long grown in the same locality to assume the same type. By careful selection great modifications can he made and fixed in a few years. Only careful selection will keep any variety uniform in its characteristics.

Corn may be improved by buying new varieties, by producing them by cross fertilization, or by selection of seed of those now grown. It is rarely wise to get a new variety from a widely different climate—removing them even one hundred miles north or south is often inadvisable. New varieries are often greatly over-praised, Fortunately there are good varieties in almost every county in the great corn-growing regions. It is safer to retain these, while carefully trying promising new varieties.

In selecting extremes should be avoided, Remarkably large varieties mature late; very early maturing varieties are small-eared. Remarkably small-cobbed varieties do not produce large crops; very large are unsafe in unfavorable seasons. As much size as is safe is desirable. It is often well to grow a few acres of an early ripening variety for early feeding.

For central Illinois, select a comparatively low, short jointed, thickish stalk, with the ears borne low, on short "shanks;" the ears about nine inches long, two to two and one-half inches in diameter ; nearly uniform in thickness throughout, with 16 to 20 rows, well filled at each end, and with but little space between the rows ; the kernels rather thick, solid and as deep as may be, and of any color preferred, as this has little to do with value. Our method of selection has all been in direction of fixing the habit of bearing but one ear on a stalk. It is believed it would be easily possible to grow two good ears on an average. Continued selection of two ears would fix this habit.

The best time for selecting seed is in the early fall, as then the character of the stalk and the time of ripening may be noted. Corn need not be thoroughly matured when gathered for seed. It may be kept in many ways ; the essentials being to get and keep it thoroughly dry.

Corn is less exhaustive to the soil than was once supposed, but as a rule it should not be grown more than two years in succession. It is almost always helped by liberal manuring. A good grass or clover sod is admirable for it, Fall plowing is desirable. On our prairie soils it does not need deep plowing, Thorough preparation of the soil greatly reduces necessary after-culture. The best time to destroy weeds is when they commence their growth. Early planting is desirable, but this may be overdone. It is well to consult both the Almanac and the thermometer. Until soil is warm enough for the corn to germinate, no good comes from planting. Width of rows and number of kernels should vary with size of varieties. Except for extra labor in cultivation, drill planting is better than hills. Imperfect and uneven "stands" are a chief cause of small crops. It is not certain that it would not be wise to plant more thickly than is desired, and then "thin out." Re-planting is usually unsatisfactory. Three kernels to each hill are usually desirable. Especially early in the season, shallow covering is wise.

The object of cultivating corn is to destory the weeds, loosen the soil, and in dry weather prevent evaporation ; the loosened surface acting as a mulch. Cutting the roots is almost always a necessary evil. Deep and close culture while the corn is small may be helpful ; later, only shallow culture should be given. With clean land any cultivation when corn has made large growth will probably do more harm than good.—*Farmers' Review.*

RHEA IN MEXICO.

I notice from time to time expression of opinion by correspondents in your columns to the effect that successful as tea has become Ceylon planters will do well to see that they be not again caugth as was the case with coffee, with all their eggs in one basket. Whit this in mind, and remembering the nature of your climate in the low country and in mid region between it and the hill ranges, I have lately been taking notes in regard to the growth of the rhea plant from which is made the well known and valuable China grass as well as of its manufacture into a great variety of fabrics. There is a Rhea Manufacturing Company in London, with a factory on the the River Lea, and a large extent of land in the Madras territory where the plant is being grown and treated for handy shipment. During the currency of the Colonial Exhibition I had frequent opportunities of examining the beautiful fibres and cloths shown by the Company in the Indian Court, They have already induced manufacturers to take up the article, but what is wanted is a larger supply, for there is very little doubt that many thousands of tons of the prepared fibre would be taken at paying prices, Having had, whilst in India, some experience in the growth of the rhea plant, I do not hesitate to say that it is most readily cultivatable in a moderately good and light soil, in a climate such as exists in the Ceylon maritime districts and, even as high up as Gampola and Kadugannawa In many parts of India it is successfully grown, but hitherto the difficulty has been in separating the fine long fires from the woody stalk, covered as it is with resinous matter. This, the Company declare, can be easily and economically carried out by adopting a very simple process which they have patended. They are prepared to enter into engagements with any persons who will grow the plant and supply them with the fibres in the raw state under their patent, In placing before you, for the information of your readers, a few extracts from the Company's lately published pamphleat, I have in view the possibility that the cultivation may find someone willing to give it a trial on a small scale, in some moderately moist district Saffragam, Kurunegala, the K-lani Valley, Kalutara, Galle, Matara, and doubtless other localities would be suitable The pamphlet in question says :—"The Rhea Manufacturing Company will supply seeds and plants and cuttings, and will either buy the ribbons or, in certain cases, accept drafts against consignments intended for treatment, and sell them to the best advantage of the consignor. The Rhea Manufacturing Company is prepared to consider propositions for its sole agency in such of the British Colonies and dependencies as are not already occupied by its licensees ; the principal duties of such agents being to facilitate the cultivation of rhea by even the smallest landholder The patent processes of M. Favier, and Professors Fremy and Urbain, of which this Company holds the exclusive rights, render it possible to convert into ribbons, on the ground where grown, the whole crop so soon as cut, As this is done without breaking or beating the stems all the nature and valuable qualities of the fibr

are preserved. The preparation of the raw material so obtained is completed at the Company's extensive works on the River Lea, near London. Growers, therefore, dealing with the Rhea Manufacturing company, Limited, will produce at the smallest cost, and will receive the highest market rates. Rhea varies in its yield and quality according to the latitude in which it is grown, the land in which it is planted, the time of year in which it is cut, the rain fall of the locality, or facility obtainable for artificial irrigation. A consideration of paramount importance is that the outlay, diligence, and care indispensable for a rhea plantation *cease* (so far as the area planted is concerned) with the end of the second year. After the second year the agriculturist has an increasing and perpetual income, and a minimum expenditure. Rhea is an evergreen and once properly planted fills every vacant spot of ground, leaving no room for weeds. The normal crops usually begin only after the second year of planting; from that time the crops obtainable throughout India and latitudes from 0° to 20° may be calculated as from 8 to 6 per annum, each crop giving in the third year about 200,000 stems per acre. This number however, as well as the weight of each stem and of the fibre in each stem, will vary according to the conditions mentioned above. Taking an average of four crops a year, or 800,000 stem, per acre per years, and 10 green stems (stripped of their leaves and with the tops off) to the pound and taking it also that the ribbons, when decorticated will weigh one-tenth of the gross weight of the green stem (stripped off its leaves and minus its top) the 800 000 green stems will weigh 80,000 lb., and should yield 8,000 lbs of dry ribbons. Assuming the selling price of these ribbons to be £10 per ton on the ground, there would be in the first and second years enough tops for the nursery, plants for transplanting and stems cut for ribbons to cover all costs incurred, except the original outlay for preparing the ground and purchase of plants. According to the statements of the manager of the Company, it will require about two millions of matured stems to yield a ton of marketable fibre, worth £ 30 The preparation of the ribbons for working into the fibre is. I am assured, of the simplest and most inexpensive kind, by a patented process which the Company will place at the disposal of anyone working them. I furnish these outlines in the belief that some one, or more with spare land on his hand, may care to try this new cultivation.—*Ceylon Times.*

BRICK TEA.

By the Peripatetic Planter

In one of my former articles upon Brick Tea, I mentioned that I had written to Hankow—the River Port on the Yangtzi kiang, at which Brick Tea for Russia is made—for information upon certain points connected with the inquiry I was engaged in. By last mail I received the following reply from my correspondent in the Tea trade,—which adds some interesting and useful details to the information we have now before us:—

"Hankow, 5th March, 1887.

"I am in receipt of yours of the 10th December * * * and I will proceed to answer your inquiries as well as lies in my power

"The duty on Brick tea entering Russia by Black Sea ports is the same as that on Congou tea—the equivalent, I believe, of about 1s 8d per lb; and no Brick tea consequently enters Russia by that route so far as I am aware. The duty on Brick tea *via* Kiachta or Vladivostock is 5 roubles gold, (15s) for 40 Russian pounds (=36 English pounds)—the equivalent of 5d. per lb Eng lish. The total amount of such tea shipped from here and Kukiang by this route for the 12 months ending December last, was 31,000,000lbs.—an increase of some 6,000,000lbs. over the previous period. The cost of overland freight, in Siberia I know to be very high, but I cannot give you the precise amount. But in any case you may take it that it does not exceed the difference between the Siberian and European (Russia) duty; and of course a large proportion of the shipments hence does not proceed so far as European Russia.

"Within recent years the Russian houses here have substituted steam presses for the old fashioned Chinese lever press, but they still retain the Chinese wooden mould—an attempt to devise iron moulds a few years ago proved quite unsuccessful. Each press will turn out about 900, or 1001 bricks a day of 24 hours. The cost of a press I do not know exactly. * * The tea pressed is simply broken tea—not fannings, Mr. Geo. White can shew you no doubt a sample of Hankow dust, which is what is actually used. The Bricks are not made of any particular dimentions; they average about 10 inches by 6 inches by 1 inch, and weigh 2¼ lbs English. In certain districts in Mongolia they use what is termed Green Brick tea, which is pressed from the coarse leaves of the shrub, not broken, and still connected with the small twigs, but this forms only a small proportion of the entire trade. By the next opportunity I will send you an ordinary brick as a specimen,"

Then speaking of the trade in Indian Brick tea my correspondent goes on to say:—"I am afraid you will find a good many difficulties in the way. The Russian Government is certain to [illegible] such a trade pretty heavily, to start with; and the system on which business is carried on in the Russian tea trade necessitates the employment of large capital, as the merchants give credit for a year or more. A shipper from India on his own account would most likely remain out of his money for perhaps 18 months."

Thus matters are clearing up all round, and we are beginning to understand the position of Brick tea in the world, for the first time It is now evident why Russian merchants in Hankow prefer the immense overland route *via* Siberia to the less costly ocean route *via* the Black Sea, and it is as I led you to expect, owing to the excessive duty in European Russia.

Next we learn the startling figures reached by the Brick tea export trade from 2 ports on the Yangtzi-Kiang 31,000,000lbs. In the event of a war between China and Russia at any time, here is an awful prospect indeed for our low class teas to have to face! The only market for Brick tea being closed, a very large proportion of these 31,000,000lbs. would no larger be made into brick tea, they would be sent somewhere. These are fired (*pucoa*) teas remember; not *cutcha* teas like the Yunan Brick tea.

We also learn that Thibet and Central Asia, including Persia, at present are the only markets ever likely to welcome Indian Brick tea, save in the event of a war between China and Russia, in which we remained neutral. Upon the chances any such war would offer it would be exeremely rash to count.

Then as to the presses used by the Russian merchants, the difficulties originally experienced have been overcome, in the Brick tea press to which I called your attention some time back—not the Compressed Tea press, be it understood. This new Brick tea press can turn out 4,000 bricks per day of 10 hours; as against the Russian presses spoken of above which only turn out 900 to 1,000 bricks in 24 hours. It employs steel moulds successfully, and makes a much denser, harder, and better brick in every way, than the presses now in use, judging by samples of their bricks which I have already seen. It makes the bricks of 2¼lbs, only 8¾ inches, by 4½ inches by ⅞ inch., a saving of 1¼ inches in length, by 1⅞ inches in breadth and by ⅛ inch in thickness, *per brick.*

Next, we find employed for the first time, the term "Green Brick Tea," distinguishing the *cutcha* from the *pucca* Brick tea, and we also learn that this "Green Brick Tea" is consumed in Mongolia, if my correspondent's informant has not confused Mongolia with Thibet.—*Indian Planters' Gazette.*

MANUFACTURED CATTLE FOODS.

We give below the essential parts of a lecture delivered on March 8th before the Royal Manchester, Liverpool, and North Lancashire Agricultural Society, by Mr. Alfred Smetham, F.C.S., F.I.C., of Liverpool, analytical chemist to the association.

Promising that the severe competition in the importation of foreign meat—dead and alive—rendered it necessary to use whatever means were available to raise stock and crops at less cost, the lecturer remarked that during the past twenty years the number of imported foods had been year by year increasing, the farmer may well be excused if he fails to gauge accurately the merits of many foods all equally vaunted by their vendors. Meanwhile important improvements have been made in the machinery for removing oil from seeds, and there has been consequently a growing poverty of the cakes or meal, which being by-products, and of less value than the extracted oil, are rendered as devid of oil as the crusher with the methods at his disposal can manage, when it is remembered that one part oil is worth more than twice its weight of starch, suger, or mucilage, it will be easily seen that this diminution in the percentage of oil is of great practical importance.

A fattening beast my be looked upon as a machine which changes its food into flesh and fat, and to some extent bone; but it does this at a considerable expense of food. The changes which take place are not simple chemical operations, like those which take place in a soap or alkali works where the greater part of the substances employed are converted into marketable commodities; but while they are constructive they are likewise destructive and the amount of meat produced bears only a comparatively small ratio to the food consumed. This is accounted for by the fat that the food has a twofold function to perform: primarily, to keep up the heat of the body and supply the energy required by the animal for locomotion &c., and secondly to form flesh and fact. It would be possible to so feed an animal that it would not materially alter in weight from year's end to year's end; but it would nevertheless consume a great quantity of food, and this consumption is the amount required by the animal to live; and except that is it necessary to have the beast alive in order to fatten it, the food so eaten is lost to the farmer so far as meat production is concerned, just as much as if it had been burned in a fire. For this reason then the number of days that that food is consumed in the animal system to no purpose should be lessened as far as possible, and it is chiefly for this reason that early maturity and profitable feeding are synonymous terms. Another very important reason for early maturity, is that the capital is turned over oftener, and this every business man knows is one of the secrets of commercial success.

Some breeds, and, indeed, some animals of the same breed, lend themselves more redily to the fattening process than others but what I more particularly wish to show is, not the best breeds for any given purpose but the directions in which, I believe, improvements in the present system of fattening may be made. To do this it will be necessary to begin at the beginning and consider the treatment of calves It may be said in reply to this that Nature has provided the proper food in furnishing the cow with milk; but a careful consideration of the question from all sides will show that while it is true that the calf is provided for by the mother, it is not necessarily the most economical method to bring up the calf on milk. I would likewise answer that the whole system of fattening is directly opposed to Nature, and that, therefore, we are not bound at all in the matter by natural laws. We must, of course, do nothing in opposition to them, but we can add to and assist them in various ways, and the creterion by which we must be guided is simply one of £ s. d.

A gallon of milk contains 1 1 5th lb. of solid matter, or real food. If, then, we use new milk for feeding a calf we are supplying it with food, taking a gallon of milk as worth 7d, at 6d. per lb. Of that pound of solids a quarter, or rather more, is butter, which at 1s. a lb. would be worth, say, 3d; thus leaving ¾lb. of solids at a cost of, say, 3d., or the value of 1 lb. of skim milk solids would 4d. By the use of a property prepared calf meal, at 20s a cwt, the same amount of feeding matter may be purchased for about 2d. or a saving of two-thirds, or half, according as new or skim milk is re-

placed by calf meal. As however, the calf meal would not be quite equal weight for weight to milk solids, the figures given are somewhat too great, but the calculation is sufficiently exact to serve my purpose.

If the foregoing statement be substantially correct the question naturally arises: "Can calf meals or other similar foods be safely used?" To this I answer in the affirmative provided proper precautions be taken. Assuming then, that a *prima facie* case has been made out in favour of milk substitutes as a food for calves, let me give what I conceive to be the proper mode of treatment and the errors to be avoided. In doing this I do not wish in any way to dogmatise or to lay down exact rules to be followed in all instances, but simply to state as briefly as may be the general principles which must govern the successful use of calf meals.

When the calf is born it should not be allowed to suck, but should be hand-fed for the first week or ten days on milk pure and simple, and at the expiration of this time, if the calf be healthy and thriving, some gruel, made by cooking—though scalding is generally sufficient—some calf meal with water, may be added to the milk. The quantity at first should be very small, and the gruel should be made weak, not more than about ⅛lb. of meal to a gallon of water. At every succeeding meal the quantity of gruel may be increased, and at the end of another week or a fortnight skim milk may be substituted for new milk. If a cream separator is in use at the farm, the change from new milk to skim milk may be made sooner than if the skim milk has been made by setting; because in the former case the skim milk will be perfectly fresh, and unlikely, therefore, to disturb the digestive organs. The golden rule to be observed during these transitions is that every change should be made gradually, so as to accustom the calf to the new food. At the end of three weeks or a month, the skim milk may be gradually abandoned, and the calf fed upon gruel and such other food as it can take.

In using calf meals in the place of or in addition to milk, it is necessary to carefully watch the health of the calves, and should any appear not to thrive, the diet should at once be altered. If however, the precautions which I have indicated be taken there need be but little fear of ill results.

In advocating the use of the calf meals I was careful to limit my remarks to properly prepared ones, and this limitation is as you will see a very important one.

A good calf meal must possess two qualities: (1) It must be free from all indigestible matter; and (2) it must contains all the element required for food by the calf, in such proportions that practically the whole may be assimilated. To make then a successful calf meal requires costly machinery for grinding to an impalpable powder and removing the indigestible matters, and a knowledge both chemical and practical of the specific value of feeding materials. It is not therefore to be wondered at that some small makers, with but little capital of either money or brains, should foist upon farmers their worthless wares either from ignorance of what is required, or from want of the necessary appliances; or an undue love of gain. Some of these inferior meals have brought calf meals generally into disrepute, but I venture to think that experience will prove the advantage of their use, and in the future they will be considered as necessary in rearing the calf as the oil cakes are in fattening it in maturity.

I had advocated the use of gruels made from prepared calf meals in preference to those made from crushed linseed, or oatmeals, because, if properly prepared, the former are better adapted to their purpose, and, as a rule, are much safer to use. The extra cost of calf meals is, I believe, fully compensated for by their greater digestibility, and the greater ease with which the gruel may be made.

As the calves progress it is necessary to accustom them as early as possible to the more concentrated and cheaper foods, and, with this end in view, they should have at their disposal linseed cake and "chop," so that they may be gradually weaned from the gruels of which I have spoken. In this change, as in the former, the diet must be altered gradually and with care.

But it is when this stage is past that the great expense commences, and the true value of early maturity begins to assert itself. An ox of 1,000 lbs., not increasing in weight and kept quiet in a stall, will consume more than half a pound of albuminoids, 7 to 8 lbs of carbo-hydrates; or say, about 10 lbs. of maize a day. This, then, is the minimum quantity required by the ox that it may simply live, and a calculation will suffice to estimate the gain to the farmer for each week that the fattening process may be shortened. Taking the present price of maize at 5l. a ton, the cost of food in order to enable the ox simply to exist would be 5½d. a day, and if it be ripened three months earlier than has been the custom the saving be 50s. If then three months could be saved in fattening 100 such animals there would be a clear gain of no less than 250l, irrespective of the interest on money and the cost of labour.

Wolff, a German experimenter, has shown that for oxen the relation of the albuminoids to the carbo-hydrates should be 1 to 7 at the commencement of fattening and that the albuminoids should be increased to 1 to 55 towards completion. If less albuminoids than this be given there must invitably be loss of food, which passing through the animal in an undigested condition, is absolutely lost, for the carbo-hydrates are no good whatever as manure. If the error be on the other side—viz, the use of too albuminous food—the farmer has the satisfaction of knowing that all the carbo-hydrates are digested, and that any undigested albuminoids will be found in the manure, and as these are worth nearly what he pays for them as manure the loss entailed will be small. It should be the object of the farmer, therefore, to ascertain that the food he is giving to his fattening beast does not have a less ratio than 1 to 7. To do this he must take into consideration the whole of the food given, and by making a calculation see that it approaches nearly to the standard. Fortunately the various foods at his disposal do not vary materially in composition, and he will be able, by referring to the published analyses, to make a calculation sufficiently accurate for the purpose. In reckoning the ratio of the albuminoids to the carbo-hydrates it is customary to calculate the latter into their equivalent of starch, and to do this it is necessary to multiply the percentage of oil by 2½, and add the amount to the aggregate percentage of sugar, starch, and mucilage. By dividing the percentage of albuminoids into the total carbo-hydrates thus obtained, the ratio will be found.

Calculations made in the manner I have just described show that the ordinary foods given to cattle contain less albuminoids than are required to conform with ratios which are found to obtain the best results, and it is for this reason that the addition of oil cake and other concentrated foods is found to produce such marked result. It is not merely that the added food supplies so much more nutriment, but the proportionately greater quantity of albuminoids aids in the digestion of the excess of carbo-hydrates contained in the ordinary food. If this proposition be allowed, it must be admitted that a suitable supply of concentrated foods is the most economical mode of procedure.

The crops usually grown upon the farm which are used for feeding purposes contain in nearly every instance less albuminoids than are required for the standard I have laid down for fattening purposes. Thus grass and meadow hay have an albuminoid ratio of about 1 to 8; wheat straw, 1 to 64; mangels, 1 to 8; whilst swedes and clover hay approach closely to our standard, and have a ratio of 1 to 59. It is evident that any mixture of these foods will be deficient in albuminoids, and must therefore fail to produce the most beneficial results, unless a small amount of albuminous food be added to adjust the proportion of albuminoids. The simplest method of thus raising the proportion is to add to the diet some linseed or cotton cake, or other similar concentrated food, and in making the choice of the food or foods, regard must be had to the market prices, making, of course, due allowances for differences in composition.

To give a complete account of all the foods now in the market, would occupy more time than I have at my disposal; but a few remarks upon the more important may not be out of place. The earliest and most important cake used for feeding is linseed, which is, or was, the residue left in crushing linseed by hydraulic pressure to remove the oil. As manufactured fifteen or twenty years ago, it contained 10 to 14 per cent of oil, 26 to 30 per cent of albuminoid, and about 30 per cent of digestible carbo-hydrates; but owing to improvements in hydraulic machinery the oil left in the press cake does not amount to much more than half of what it did formerly. Other methods have been also devised whereby the oil is almost completely removed by means of bisulphide of carbon, or petroleum spirit, and the resulting cake or meal is thus deprived of its most important constituent. What is here stated as true of linseed cake is true also of all cakes and meals which are the residues of oil extraction processes, and I need not, therefore, especially treat of the deterioration of other cakes and meals, under their respective headings. I have already stated that oil ready-formed, in cake or meal, is worth 2½ times its weight of starch, sugar, or mucilage, and the removal of, say, 7 per cent of oil would reduce the value of the cake by nearly 10 per cent, and I think I am not overstating the case when I say that, taking the average of linseed cake sold, the reduction in food value is not less than 8 per cent. Fortunately the general depreciation in the price of feeding stuffs has rendered the systematic adulteration of linseed cake almost a thing of the past, and the competition in trade and the introduction of other foods have brought the selling price to very nearly its true value.

The richest of the cakes in ordinary use is decorticated cotton cake. This, as a rule, contains from 10 to 12 per cent of oil, and about 42 per cent of albuminoids, and a comparatively small quantity will, therefore, raise the albuminoid ratio to the given standard. For many purposes it is the cheapest food that can be purchased, but, owing to its concentration, it requires a considerable amount of judgment and skill to use it economically. As a rule it is best to mix it with a starchy food, such as maize, in about equal proportions. Such a mixture has a composition not far differing from linseed cake, and may be used in place of it, at a considerable saving of cost.

The undecorticated, or whole seed, cotton cake is manufactured largely in England. It is made from the same seeds as the decorticated, but it is reduced in value by the presence of from 20 to 25 per cent of worthless husks, and sometimes contains a considerable quantity of "cotton-wool." The presence of the woody fibre and "cotton-wool" has not unfrequently been the cause of stoppage in animals, not a few such instances having come under my immediate notice. It is preferred by many farmers because it is less concentrated than the decorticated, but, taking into account the market prices, it is really less economical, as it contains only 6 per cent of oil and 25 per cent of albuminoids.

Maize meal is a cheap and effective food, but it cannot be used for adjusting the albuminoid ratio, because it is found to contain only about 10 per cent of albuminoids. It has 5 per cent, of oil, and nearly 70 percent of starch and digestible carbo-dydrates. During the last year or two a cake made by pressing the germs of maize which are separated by the roller process, has been introduced into England. The germs are richer in albuminoids and oil than the remainder of the seed, and the cake has a greater feeding value. If made in any large quantity it will be a valuable addition to our list of foods.

Somewhat similar to maize are oats wheat, and barley, the first being the richest in albuminoids and oils, and having an albuminoid ratio of 1 to 55. Peas and beans are rich in albuminoids but contain scarcely any oil. Palm-nut and cocoanut cakes and meals are rich and valuble foods, more particularly for dairy stock.

Feeding experiments have shown that irrespective of the albuminoid ratio, a mixture of foods will produce better results than a single food having the same amount of digestible ingredients. This is doubtless chiefly due to the fact

that in the mixture the constituents, more particularly the carbo-hydrates, are more varied. In linseed mucilage predominates; in maize, starch; and in locust beans, sugar. If a mixture of these three be made, mucilage, starch, and sugar will be present in approximately equal proportions, and the digestive organs will have less work to do to obtain a given amount of nutriment; and consequently the beasts are able to consume and assimilate a larger quantity of food, with the result that fattening goes on at a greater pace.

This fact has been mainly instrumental in bringing into the market of late years a larger number of mixed meals and cakes. When prepared from pure and sound materials, and mixed with due regard to the proper composition, and sold at a fair price, these meals and cakes may be advantageously used, and in many instances will be found to yield satisfactory results. As, however, such foods may be made of almost any composition, it is advisable to buy only such as are of guaranteed strength, or are sold by firms in whom implicit confidence can be reposed.

What I have already said with regard to the food required by fattening animals has paved the way for the second part of my subject, viz., milk production. If we were justified in looking upon a fattening animal as a machine in which the food constituents were transformed into meat, we are still more justified in considering a milking cow in this light. As in the former case a certain proportion of the food consumed is utilised in simply allowing the cow to live and to maintain its condition, and it is only the food that is given in excess of this quantity that can be economically employed in the production of milk. It is no more possible to obtain milk from a cow without proper food than it is to obtain cloth from a loom without a proper supply of the necessary fibres; and it may perhaps, make the matter clearer if we first consider what are the substances produced by a cow in full milk, if we assumed that a cow produces say five gallons of milk a day we shall find from chemical analysis that it parts with nearly 2lbs. of butter 2lbs. of albuminoids chiefly in the form of casein, or curd; 2¼lbs. of milk sugar, and ⅓lb. of mineral constituents; to produce which, assuming nothing whatever to be lost, would require, roughly, about 10lbs. of linseed cake of good quality. If we add to this the 10lbs. of maize required to enable the cow to live, we obtain, as a minimum food supply for a cow producing 5 gallons of milk a day, no less than 20 lbs. of an equal mixture of linseed cake and maize, or, what would be the case in practice, its equivalent in other foods. As milk contains about 87 per cent of its weight of water, it is found best to supply milch cows with a liberal allowance of succulent food, and to supplement this with a comparatively small proportion of the more concentrated foods. The necessity of doing this will be made apparent by a consideration of the composition of milk, which is found to have an albuminoid ratio of 1 to 3·3, and to contain a large proportion of fat. Meadow grass has a ratio of 1 to 8, and it is clear therefore that unless some more albuminous food be given, a considerable amount of the food will be absolutely wasted; and there can be no doubt, therefore, of the wisdom of giving cows at grass an allowance of cake or meal. Wolff states that the food of the milch cow should have an albuminoid ratio of 1 5, but this doubtless, is rather high and a less expenditure than would be thus entailed would be more profitable. Nevertheless, from 3 to 6lbs of cake or meal a day may be profitably given to cows, the quantity being regulated by the quality of the foods, and more particularly by the nature of the grass.

In making calculations as to the cost of thus highly feeding stock, care must be taken not to charge the whole amount to the increase in milk or meat. It has been shown by Lawes and Gilbert, and other experimenters, that from 90 to 95 per cent. of the nitrogen consumed in concentrated foods is voided by the animal, and if the manure be properly treated is available as plant food. We shall not therefore greatly err if we take 90 per cent of the nitrogen contained in a food as valuable as manure, and if we place the value of ammonia at 4*d.* a lb, we find that the residual value of decorticated cotton cake would be about 3*l.* for every ton of cake consumed. Such an addition to the manure of the farm will enable the farmer to grow heavier crops, and consequently to rear more stock or keep a greater number of cows and as rent and taxes are constant quantities, it follws that the profit per head will be proportionately increased.—*Chemist and Druggists.*

FELSPAR AS A POTASH MANURE.

SIR,—I observe in your issue of the 20th instant that Dr. Aitken has made some successful experiments on the manurial properties of ground felspar. Ordinary pink felspar, known mineralogically as *orthoclase*, forms one of the constituents of granite and consists chiefly of silica alumina, and about 12 per cent of potash. As felspar is generally regarded as an insoluble mineral, it may be of interest to draw attention to a series of experiments on the solubility of various minerals, described by Mr. A Jhonstone in the lately published *Transactions* of the Edinburgh Geological Society. At page 282, vol 5, Mr. Jhonstone states that he took three pieces of orthoclase, and after carefully weighing them put them into separate vessels containing distilled water saturated with carbonic acid gas, and allowed them to remain immersed for three months

The first specimen was placed in a flask, which was then corked and put away on a shelf, where it remained motionless during that period. The second was suspended in a beaker, the water in which it was immersed being agitated for about ten minutes every day for the three months. The third was placed in a shallow dish and barely covered with the carbonic acidulated water so that the upper surface of the crystal was nearly in close contact with the air. The water was gently shaken for about ten minutes every day during the three months.

When the specimens were examined at the end of that period, the first had become slightly softer on the surface than before, but had scarcely decreased in weight and the liquid surrounding it, when evaporated down scarcely left any residue. The second specimen was decidedly softer, and the solution left a residue containing potash and carbonic acid, with traces of lime and soda. The upper surface of the specimen which had been in almost close contact with the air was found to have altered its appearance and to have changed its bright translucent aspect and become covered with an opaque dust-like crust of kaolin. The solution left a larger residue consisting of potash, soda and carbonic acid, with traces of lime and silica.

In these and other experiments on various felspathic minerals, it was always found that decomposition takes place fastest when the water is in ready contact with air. 'The more air, in fact along with water, the more rapidly desintegration proceeds. These results are agriculturally of interests, as they show the comparative ease and rapidity with which felspar can be decomposed and its alkaline ingredients dissolved out. The experiments were made on single crystals of felspar, with the smallest possible surface on which the atmospheric disintegrating elements could work. By grinding the mineral, and so enormously increasing the surface, the alkalies might be practically all extracted in a season, if the powder were used as a light manure.

The felspar used in Dr Aitken's experiments was obtained from Norway; but there is no need of going so far a field as this mineral exists in abundance in the remote parts of our own Highlands, and in some of the very poorest districts where the crofters are most in need of employment The western coasts of Sutherland and Ross, with the whole of the outer Hebrides, consist of barren tracts of gneiss, traversed by multitudes of veins of pegmatite'—a coarse variety of granite, chiefly made up of orthoclase felspar. Water-power is often abundant in these poverty-stricken parts of Britain, and the mineral might there be quarried and ground, and shipped to the south at a cheap rate.—H. M. CADELL, in.—*North British Agriculturist*

A SUGGESTION FOR AGRICULTURISTS.

ONE of the most striking features of our Indian gardens is the abnormal growth—to English eyes—of many well known English garden-plants in this country Petunias flourishing like original sin, and sowing themselves like nettles all over an Indian garden; Phlox in such luxuriance that Sutton and Sons seeing it might die of envy; Heliotrope in bulky bushes, roses of choicest kinds straggling with tons of blossom in vast heaps and hedges; Sun-flowers of a bulk; and girth and color fit to take first prizes in the best English company; and Crysanthemums of every hue and shade prolific as the wildest breeds. And the flowers we have mentioned, are of no one type or isolated Natural Order. They are a handful taken at haphazard from the plant world at Home, and transplanted to this country to find, for some reason or another, circumstances three times as favourable to their development, in spite of poor soil, blazing sun, and indifferent horticulture. The same holds good with vegetables. Carrots like legs of mutton; beet root which might almost be carved into canoes, peas that English gardeners may dream of but never see; cabbages so closely grown that they actually die of suffocation; and a hundred other English vegetables that in parts of India reach a point of excellence unattainable at Home. It is true that most if not all of them degenerate in the second or third generation but much of this falling off is due to the *mallis* unscientific method of raising and collecting seed for next year's crop and even if it should be found impossible in the plains of India to grow seed equal to English seed the latter can always be imported or better still scientific farms might be established in the Hills where the climate is thoroughly English for raising seed of such plants as may be required. For the present the broad fact is enough, that many English flowering plants and many English vegetables do infinitely better in this country than at Home. The next thing, is the application of that fact to commercial uses.

In Europe, herb farms, for the growth of plants whose products have some special market value, are one of the most remunerative forms of agriculture, and in some countries whole districts are given up to the cultivation of some single flower for export. We may take, for instance, the consumption of such herb products in America, where they are almost all imported, with the exception of the oil produced from peppermint, and of that a considerable quantity is exported. Of valuable oils extracted from other flowering plants, the following are staple articles of sale and consumption by perfumers, druggists, artists, and others—the market values are attached to the articles:—anise, $1 75 per pound; bergamot, $2; native citronello, 65 cents, (this is the cummin sweet-scented, yellow flowered currant, commonly called citronelle;) American cummin, $4·50; fennel, $2·25; rose geranium $10; lavender, 90 cents; lemon, $2; orangeflower (Noroli) $30 to $70; sweet orange $1 75; bitter orange, $3·75; peppermint, $2 65 to $3; pennyroyal, $1·40; spearmint, $3; tansy, $3·50; thyme, $1; wintergreen, $2; wormwood 7 to $9.

Of flowers dried, the following are used in regular commerce:—American calendula, 24 cents per pound; chamomile, 30 cents; elder, 14 cents; lavender, 4 cents; mullein, 70 cents; American saffron, 30 cents, and Spanish $10 to $12, all per pound. Of leaves, the list is almost endless, but we may add that a large quantity is used in the preparation of smoking tobacco. In some of which the odours and flavours are easily recognised. Of lavender flowers, 50,000 pounds are imported yearly from Germany for this use, while coriander, anise, fennel, cummin, and caraway seeds, and laurel, sweet clover, dill and rosemary leaves are also used in large quantities for making what are known as flavours for the tobacco manufacturers.

Now these are only a few of the different vegetable productions widely used in the United States and imported for the purpose. How many are used in the different countries of the world it would be hard to guess. Among them all a large number we may be assured would grow in India with a luxuriance unknown in colder lands. Government might easily do worse than to try experiments in the different provinces of India with all plants whose products command a commercial value, and are capable of export. A list might then be published of those which are *peculiarly* adapted to growth in this country. At first, at any rate, Government might undertake to supply the seed at a moderate cost, together with information as to preparation and export of the product. We may be quite sure that in India the produce of any plant which flourished in this province, as, say, the *marechal Niel* rose flourishes, would soon command the markets of the world.—*Civil and Military Gazette.*

PEPPER ADULTERATION.

THE public analysts are following up their recent action with poivrette, by insisting prosecutions for the adulteration of White Pepper with Long Pepper. In the first case tried, a grocer, who appears to have bought in good faith, has been fined for the sale of this admixture, in which it was shown that the sample contained quite 50 per cent of Long Pepper. As white Pepper costs at the lowest 11½d per lb., while Long Pepper can be had at about 6½d., lb, this proportion would yield a profit to the grinder of 2½d per lb., on the ordinary profit of wholesale grinders varying from ½ to ¼d. per lb. on common Peppers. This will show the extent of the temptation held out to this form of adulteration, which it appears that the law is now about to repress. Quite possibly the mixture would, however, be sold considerably below the proper lowest price of ground White Pepper (11½d at the moment at first cost), in which case the Long Pepper would be used to secure the trade of those who supply the real ground White Pepper of commerce. Till quite recently the use of Long Pepper for mixing with ground White Pepper was absolutely unheard of in the Spice trade, and, in fact, no one acquainted with the properties and qualities of the two substances would think of mixing them together, for ordinary trade purposes. If the mixing were carried far enough, indeed, the medicinal taste and smell of Long Pepper would not take long to destroy the demand for White Peper, and the authorities thus not entirely in the interest of the Peper trade. Long Pepper, in fact, renders hot meat almost uneatable, and several cases have recently transpired where Pepper has been returned to the retail grocers who supplied it, on this ground. The retail grocers can readily detect this practice by smelling the White Pepper supplied to them in bulk, for once known, the Long Pepper taint is readily recognised. Samples of Long Pepper can readily be prepared, by pounding up a few pods, if they desire to check their stocks of White Pepper. It will be well for retailers to examine their stock, and to communicate with the wholesale houses, from whom they may have bought, in all cases of doubt, now that a legal judgment has been obtained that the use of Long with White Pepper is an adulteration. Long Pepper in its proper place, and sold under its own name, is of course a perfectly legitimate article of commerce, and it serves a very useful purpose in the various pickles

The following remarks are from the *Liverpool Courier* of August 18, 1886:—

It must not be imagined that the Long Pepper prosecutions are a mere matter of sentiment or an invocation of legal machinery simply to enforce the letter of the law. Long Pepper does something more than increase the bulk of the Pepper with which it is mingled, and thus it differs from poivrette As Dr. Campbell Brown explained in a recent contribution to the *Analyst*, Long Pepper is the fruit of the *Chavica Roxburghii* whose plants grew wild by the side of the water courses of India, and invariably bring with them a mass of dirt imbedded to the crevices and irregularities of the fruit; the collectors taking care to increase rather than lessen the dirt, because they are paid by weight for what they carry to the merchants. A recent contributor to *The Produce Market Review* declares that the earthy medicinal taste and peculiar drug like smell of Long Peppar quite destroyed the flavour of White Pepper which, trade view of the substance is supported by the opinion of Dr. Campbell Brown, who says: "Not only is Lodg Pepper a fraudulent admixture in Ground Pepper, but it is objectionable on the score of quality and flavour. Its disagreeable offensive odour is developed by warmth. Any candid person can convince himself of the real cause of the objections which housekeepers and grocers alike have to ground Long Pepper if he will heat up a piece of cold meat between two plates, and sprinkle some fresh Long Pepper on it; the smell and flavour are so offensive that he will be obliged to reject the meat." The plant, whose compact fruit spikes (when sun-dried) form the debated Long Pepper resembles in some respects the common British plantain used for pet birds, and is altogether different from the *Pipere Nigrum* which supplies the real condiment for the dinner table. Though Long Pepper may serve a useful purpose of its own, it has no legitimate place as a substitute for Pepper proper, and its use as a sophisticating agent with Ground Pepper is a distinct fraud, enabling the adulterator to increase his gains at the expense of both the stomach and the pocket of the consumer. It would hardly pay the retailer to adulterate himself, but if he purchases his Pepper at rather less prices than those current in the market, he must have a shrewd suspicion that the wholesale dealer has resorted to illegitimate methods to meet the requirements of cheapness.—*Produce Markets' Review.*

COMPETITION IN WHEAT-GROWING.

A WRITER in the current number of the *Quarterly Review* on 'Competition in Wheat Growing" deals with the subject from a somewhat novel point of view. Most people in England are accustomed to think of the English farmer being beggared and driven from the field, while the American wheat-grower secures the bulk of the trade and waxes wealthy. That the idea is a very erroneous one, this article seems clearly to make out. It is not only wheat-growers in England that have been wholly or partly ruined by the long period of low prices. American farmers have suffered, if anything, more severely, their financial condition places a large number of them on the verge of bankruptcy, and in the struggle for existence among the wheat-growers of the world, their chances of holding out are inferior to those of their British competitors. This is certainly changed reading for the English farmer, of whose position, it is usual to speak of on the platform and in the press, as all but hopeless; and the arguments brought forward in support of so sanguine a view of the situation will merit careful examination more specially as they have an important bearing on the production of wheat in India, which has of recent years come to be one of the chief industries in our midst. The writer's main contention is that during the last few years wheat has been grown at a loss all the world over, India excepted. This is due primarily to the enormous extension of the wheat area of the world, and a consequent glut of the market. Thus, for example, in the decade ending 1880 the acreage under wheat in the United States alone rose from nineteen millions to nearly thirty-eight millions; in Australia, in the ten years ending with 1884, there was an increase of over two million acres of wheat; according to an official report the wheat acreage in Bombay is believed to have been doubled during the last twelve years; the wheat area of all India, including the Native States, was over twenty-seven million acres last harvest, an increase of probably one fourth of that large acreage since 1874, when India first began to export wheat on an extensive scale; and Egypt and Chili also helped to overstock the wheat markets of Europe. It is clear that the enormous increased supplies were quite out of proportion to the needs of the increased population of Europe. The inevitable result was a fall in the price of wheat to a point which has rendered its cultivation unprofitable both in England and in America. "Growing wheat at a loss," as the writer in the *Quarterly* remarks, "is an operation that cannot be persisted in for a long period on an extensive scale." His conclusion is that in America we shall speedily witness a large shrinkage in the area under wheat, in which event the market will recover tone, an average price per quarter—forty to forty-five shillings—will be reached, at which by calculations of proved accuracy it is shown to be possible to grow wheat with a margin of profit in England, and the good old days will come back for the British farmer.

The writer refers to numerous official documents and has been to the pains of collecting elaborate tables of statistics, to establish his contention that wheat-growing in America is at present being carried on at a ruinous loss, only a very few farmers being able to show the barest margin of profit representing earnings less than those of an ordinary farm labourer. All the official evidence being collated, the startling result is brought out that the American wheat crop of 1885 was actually grown at a loss of over seventeen million sterling; and as the reports on the cost of cultivation, on which the official estimates are based, are certainly too low, by about ten shillings an acre on an average, the total loss on the crop may be put down at fully double the amount just stated, or £34,000,000. Visual proof of the embarrassed condition of American farmers is not difficult to find, deserted farms, foreclosed mortgages, and petitions in insolvency being quite common in most States. The fact is, that, in addition to having to contend with the fall in prices, the American farmer is rapidly losing two exceptional advantages he has hitherto enjoyed—cheap lands and natural fertility. His crops, too, are more liable to serious damage and partial destruction. Then, the fall in rents over England is also helping to bring the British farmer to conditions of equality in wheat production. A most important factor, moreover, in the working out of the problem is the calculation as to how soon the increase of population in the United States will compel the country to cease from exporting wheat. The population of the United States rose during the decade 1887-80 from 38,558,371 to 50,155,783. At the same rate of increase, the number in 1890 will be nearly 65½ millions. During the five years ending with 1884, the average annual consumption of wheat in the United States was nearly 324,000,000 bushels, and the average export 140,000,000 bushels. Working without these figures, the writer arrives at the conclusion that by the end of the century the present production of wheat in America will be insufficient for home requirements, and that European countries will have to look elsewhere for that main portion of their foreign supply which at present comes to them across the Atlantic.

As all these considerations have a direct bearing on the chances of India becoming the granary of the world, it will be interesting to note the reviewer's comments on the condition of the trade he[re]. He subscribes to the generally admitted opinion that the extr[eme]ly low prices that of late prevailed in the European markets are, attributable to the large increase in the supply from India, and he also holds the much more disputable view that the extension of the wheat area in India in face of these low prices is solely due to the low gold value of the rupee, which has the practical effect of giving a handsome bounty on every bushel exported from India. As we have indicated, this latter point is open to a good deal of argument. Indeed, the writer's own previous line of reasoning is not altogether consistent with such a conclusion. By the fierceness of competition, the price of wheat in Europe has been driven far below the figure at which it can be grown either in America or in England without incurring a loss. India, however, has been able to pour in her supplies, and make a profit despite low prices. The

ebbing value of the rupee may have partly aided her in securing this position, but it is jumping to a somewhat rash conclusion to say that this has been the only cause at work. In fact, it is abundantly clear that wheat can be grown in India and carried to England at a very considerably lower figure than is possible in the case of America, and this fact must in the end assert itself apart altogether from the relative value of the rupee. When America ceases from the suicidal policy of growing wheat for export at an enormous loss, the supplies from that quarter will fall off, and the price of the article will recover In the benefit of this rise India will participate, and so even should the rupee go up in value, her ability to hold her own in the market will be unaltered. Moreover she has a great reserve of power in the fact that improved railway communication and lowered freights—there is every indication that, with new services being started, we are entering on an era of much closer competition among shipping companies trading to the East—will largely lessen the expense of placing her wheat on the European market. Then when the adulteration of the article—either through ignorant methods of agriculture or by wilful sophistication—has ceased, and we no longer behold the farce of the ship in every twenty carrying home a cargo of "dirt," a further saving must on all grounds of common sense be effected. So, though the depreciated rupee may have given a fillip to the wheat trade of India, it is palpably absurd to make it solely responsible for the increased volume of trade. We would present the writer in the *Quarterly Review* with a little arithmetical calculation. The average price of wheat in England in 1886 was 31s. per quarter. By the writer's own calculations the minimum price that will allow wheat to be grown *at the barest profit* in England or in America is 40s. per quarter. Therefore if by lessened production this advance of over ⅓ in price is attained, it is clear that the value of the rupee may also advance ⅓ without the position of the Indian cultivator being at all affected. He would be paid precisely the same number of rupees for his quarter of wheat—with 32s. paid and the rupee at 1s. 4d. he gets Rs. 24, with 40s. paid and the rupee at 1s. 8d. he would also get Rs 24. This appears to us to completely do away with the argument that the future of the wheat trade of India depends solely on the depreciation of the rupee. It further points to the conclusion that India has no need to rely on such a rotten crutch to maintain her present position in the trade, and may further confidently expect in course of years, when the home demand in America will absorb her own supplies, to become the undisputed wheat-producing centre for the world. —*Times of India*, May 18.

DISCUSSIONS ON INDIAN DRUGS.

A REPORT has just been issued of the proceedings at the fourteen "conferences" on Indian produce held at the Colonial and Indian Exhibition in June and July last.

A large number of samples of Indian drugs and other commodities were exhibited at these meetings, and some discussion took place concerning the posibility of finding an outlet in the European market for many articles hitherto quite, or almost unknown outside India. At the conference on drugs a well-known quinine manufacturer called attention to the fact that of all cinchonas, the *Ledgeriana* variety is acquiring the highest popularity for quinine-making while the *Calisaya*, and *Officianalis* varieties are most esteemed for the manufacture of other cinchona preparations. As the *Cinchona ledgeriana* can be cultivated at much lower altitudes than the others it was decided to communicate this information to the Indian Medical and Botanical Departments.

When discussing gums and resins the question arose what could be done to stimulate the successful exportation of these commodities from India, and it was then pointed out that the London gum market was especially liable to suffer loss through being glutted with inferior gums. It was stated to be a prevailing tendency among Indian gum merchants to mix and adulterate their goods, whereas the trade could only prosper if the shipments sent over were of uniform quality, and free from dirt or other foreign matter In London a consignment becomes almost unsaleable if in the interior of the packages is placed a quantity of a totally different gum from that shown on the surface. On reaching the docks the packages are examined, and, if necessary, assorted. Half, or broken packages, cannot be sold, and unless, therefore, the natives prepare honest consignments, the trade will go to other channels, which would be all the more regrettable as the present scarcity of African gums offers a favourable opportunity to Indian shippers to secure a leading position in our market.

At the conference on oils, seeds, and perfumery, a large assortment of flowers, tubers, and roots attracted particular attention. It included specimens of *Nerium odorum*, *Nardostachys Jatamansi*, *Ocimum Basilicum*, *Ocimum sanctum*, *Pogostemon Patchouly*, *Santalum album*, and *Saussurea Lappa*. The last mentioned is the sacred costus root of the ancients, and is imported into India from Cashmere.

A sample of otto from *cananga odorata*, or ylang-ylang, was said to be the first ever exhibited from India, while the tubers of *Cyperus rotundus*, and the oil prepared from them were also pronounced quite new to Europe. The tubers are largely used in Upper India to perfume clothes. A large assortment of essential oil of *Jasminum Sambac* was shown, and elicited the expression of opinion that if a uniform supply could be obtained it would fetch a good price in the London market. The same opinion was given with regard to the otto of *Mentha viridis*, the sample being pronounced superior to anything that had been seen in London for some time.

The three most important medicinal oils exhibited were *Gynocardia odorata*, or Chaulmugra oil, which has been recommended for the treatment of phthisis, various forms of skin disease, and rheumatic gout. *Pongamia glabra*, one of the most valuable of Indian medicinal oils, which is extensively used by the natives for all forms of eruptions of the skin and prickly heat, but which was now shown for the first time in Europe, and *Psoralea corylifolia*, an oil used in the treatment of skin disease, especially in Southern India. It was thought that the oils of *Arachis hypogæa*, *Bassia latifolia*, and *Cocos nucifera* were the most hopeful for the soap trade. Considerable interest was shown in the possibility of India extending the cultivation of the olive. It was thought that if this could be done, the consequence would be serious to some parts of Europe, but invaluable to numerous industries that were driven to seek substitutes for the already too highly-priced olive oil. Samples of most of the oils named were furnished to one of the principal English soap-makers, and reports were promised of the experiments which he would institute.

At the close of this conference samples of Indian made soaps were shown, principally from the Meerut factory, and a collection of crude petroleum, partly contributed by the Assam Trading Company. On this occasion the singular theory was propounded, that petroleum is an oil produced from fish suddenly killed by an influx of salt into an inland lake, and it was suggested that the part of India which should be most carefully examined for petroleum was Ajmere and other localities in the vicinity of the great salt lakes.

The assortment of Indian dyes was of an extremely comprehensive character, and included a large number of specimens almost unknown in Europe.

The many varieties of cutch exhibited attracted especial attention among the merchants present who, accustomed to handle only that variety of cutch which is produced in Burmah, had never seen the Kumaon crystalline form of the article, and considered it to be an impure kind of gambier, and not cutch. It was explained to be produced from *Acacia catechu*, by a different process from that followed in Pegu. Dr. Watt drew attention to the auxiliaries used in India in dyeing, and stated that a great deal of the success of the native dyeing and printing was due to the fact that so may clearing and intensifying agents were used with the dye-stuffs proper, the merits of which were not fully understood by European dyers. Scarcely any process of dyeing in India is attempted without a considerable number of astringent re agents of a vegetable nature, and a complicated series of mordants of a mineral character. Lime, for example, is much used in calico-printing, and during the fermentation of indigo, potash, obtained from the ash of a number of very dissimilar plants, is largely employed; the most important plants for this purpose being *Symplocos racemosa*. The bark of this bush is employed as an alkaline ash, and when pulverised also imparts a yellow colour, much used for sharpening or improving other dyes.

Attention was also called to various specimens of *Morinda*, or *al* dyes, which are the cheapest and most durable of all the red dye stuffs of India, although the process of preparing the dye is complicated and somewhat difficult *Al* is, without exception, the most abundantly used red dye in India. The fabric or thread to be dyed is first steeped for three or four days in a paste of castor oil seed, cow-dung, and water, after which the cloth is washed and soaked in a decoction of myrobalans, and afterwards in alum. It is then ready to receive the dye, and for this purpose is boiled in a decoction of the wood-chips Without the aid of castor oil seeds the red colour is not imparted, but it is found to be produced from the yellow decoction on the solution being allowed to ferment. The *chay* root of Madras, *Oldenlandia umbellata*, gives a dark red or brown colour, but, owing to competition with cheaper stuffs, this dye has almost disappeared from India, where formerly is—was extensively employed in dyeing the famous Madras bandana handkerchiefs.

The discussion on tanning materials appears to have been the only one likely to produce some lasting benefit in developing the Indian export trade, and encouraging our manufacturers to try experiments with some new articles.—*Chemist and Druggist.*

AGRICULTURAL EXHIBITION AT SHIKARPORE.

The managing committee of the Exhibition of Agricultural Machinery held at Shikarpore, Sind, on the 29th of January 1887, in the course of their report, say ;—

It was intended to hold this Exhibition of Agricultural Machinery in conjunction with the Upper Sind Horse show on the second Monday in January ; but owing to the non-arrival of the steam and American machinery through unavoidable circumstances, it was postponed. At the Horse Show people of rank, influence and enterprise in large numbers had assembled, and do annually from all parts both within and beyond the province, and the opportunity is one not to be surpassed for an exhibition and experiments of this or any kind in the interests of the people and trade. There was a fairly large representative gathering of the agricultural and trading classes and others enterested in agricultural progress at this exhibition It was remarked that many visitors displayed a keen interest in the machines, their powers and their working, which was evinced by their working out and scrutinizing with great nicety the powers and outturn of each machine, and calculating their advantages and disadvantages as compared with their own primitive appliances.

On the whole the committee consider that the show was a fair success and is a move in the right direction. From the number and nature of the enquiries made by the visitors it was clear to the committee that interest in such matters exists and will increase rapidly and that such shows will be beneficial and useful to traders and agriculturists in affording them an opportunity of, by practical demonstration, judging for themselves as to the advantages of modern over ancient agricultural appliances. That steam machiney is sure of adoption there is no doubt. At this show the 5 H.P, portable steam engine that worked the Marshall's Thresher was purchased outright by a zemindar and is now used to work pumps ordered at the exhibition for the irrigation of wheat. Estimates were applied for from Mr. Scott McKenzie for steam oil and flour mills and rice huskers, and this committee believes orders were given for some machines.

The committee would here take this opportunity to suggest that at future exhibitions arrangements be made to erect shafting, so that all machines may be driven by steam power, excepting of course those supposed to be exclusively worked by bullock or horse power. It was quite evident that most of the hand power machines exhibited were very hard and fatiguing to work and would necessitate several relays of men to work them for any length of time. The committee would further suggest that in future exhibits be on the gound at least fourteen days before the date fixed for their exhibition, this being necessary to admit of their being properly placed and tested previous to being exhibited before the public

In conclusion the best thanks of the committee are due to Messrs. Marshall & Sons, Messrs. McHinch and Co, Messrs, John Fleming & Co. forthe exhibits so enterprisingly sent by them. The agent, of the first two named firms were present at the exhibition, and were very obliging in affording information to the public regarding the machinery.

The committee tender their thanks to the agents of Messrs Marshall & Co. and McHinch & Co. Mr Scott, McKenzie, C. E., and Mr. R. Cork, and desire to record ther satisfaction of the earnest and energetic manner in which the mechanic, Mr. Hodlin, performed his duties.

STERILIZED MILK.

"The matter of contaminated milk has not received the attention which its importance deserved. The investigations of Pasteur and Tyndal into the causes of putrefaction demonstrated beyond all doubt that putrefaction is caused by germs. Beyond the point where the human eye can see lies a world of microscopical forms of life, and these last may be called the scavangers of creation. An infusion of meat can be kept almost indefinitely if care be taken to exclude germ-life. Some germs die at one temperature and others at another, but all are killed by a long-continued high heat. Professor Soxhlet, of Munich, has been applying what is known of germ life to the study of, milk, and the results he has obtained are full of interest and highly instructive, He found that where the milk was obtained from cows kept in stables scrupulously clean, and extreme care was exercised in handling it, that it would keep from two to three days. As milk ordinarily turns sour within 24 hours, this is interesting news, From this point the professor. reasons that Stirlized milk presents great advantages over ordinary milk. It is alleged that there are at the present time hundreds, if not thousands of children who are fed with milk that has been exposed to unclean conditions, perhaps partially churned in the cans, diluted, and then " doctored" with benzoate of soda, &c. It seems hardly to be wondered at that infant mortality mounts to a fearful height. Professor Soxhlet's recommendation is that the milk be heated (under steam) to near boiling point for 35 or 45 minutes—a sufficient time to destroy the *lactic acid ferment*. Milk thus prepared appears too have been given with very fair results. But the process of boiling for such a period must produce a material change in the delicate constituents of the milk, of the propriety of which, authorities aver, a judgment should be reserved. Certainly, sterilized milk is preferable to that which is badly contaminated.

" One lesson to be learned from all this is that the importance of cleanliness, not only in the milk, but in all that appertains to infant feeding, is of the greatest moment. Fresh cows' milk is unequalled for ordinary purposes, but should be often tested to see that it contains 10 per cent. of cream, and is free from sediment. Milk should not be strongly acid nor alkaline. As the casein of cows' milk is tougher and more indigestible than that of mothers' milk, Peptonising, Powders) Fairchild's process) are to be recommended, and in many cases will be found quite indispensable. They are the best agents known in artificial feeding."—*Health.*

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 2ND JUNE 1887]

Madras.—General prospects good.

Bombay.—Rain in parts of seven districts. Preparations for *kharif* cultivation still going on. Fever and small-pox in parts of seven, cattle-disease in parts of ten, and cholera in parts of six districts.

Bengal.—General rain, accompanied with storms, had cooled the atmosphere. A cyclone struck the coast with centre near Balasore on morning of 26th, and passed through Midnapore and then north-north-west. Sky still overcast, and more rain expected. Agricultural operations proceeding well Early rice, jute, sugarcane and indigo are in good condition. More rain wanted in some of the eastern districts. Cholera has much abated, and general health is fair, except in Behar, where it is indifferent.

N.-W. P. and Oudh.—Eastern winds. Cloudy weather and lower temperature in the greater part of the provinces. Rain has fallen in the Benares division. Preparation of the ground for *kharif* sowings has commenced in some districts. Supplies ample and prices fairly steady, but with a tendency to rise. Cases of cholera continue to be reported, otherwise the public health is fair.

Punjab.—No rain has fallen during the week. Except in Umballa and Peshawar, where it is fair, health is good. Prices are rising in Delhi and Rawal Pindee, high and falling in Shahpore, all most stationary in Peshawar, stationary elsewhere. Harvesting of *rabi* crops near ly completed in Sialkot, Mooltan and Dera Ismal Khan, and completed in Rawal Pindee. Outturn good in Umritsur, below average in Jullundur, Lahore and Rawal Pindee, and much below average in Dera Ismail Khan. *Kharif* ploughings commenced in Umballa, and sowings begun in Mooltan, Shahpore and Peshawar. Fodder scarce in Shahpore.

Central Provinces.—Weather cloudy and hot. *Kharif* ploughings continue. Cholera in Jubbulpore, Hoshangabad and Sumbulpore districts. Fever and small-pox in places. Prices rising in Saugor, Khundwa and Bilaspore ; in other places steady.

Burmah.—Slight measles and some cholera in several districts of Lower Burmah, and some cattle-disease; otherwise public health and health of cattle good. Weather seasonable. Reports received from six Upper Burmah districts. Some measles and small-pox. Food scarce in Yeu and Shwebo. Crop prospects good.

Assam.—Weather rainy. Ploughing and sowing of *dumai* and *murali* crops finished. Cultivation of *sali* crops continues Sugarcane being planted, Prospects of crops good. Cattle disease in parts of Gowhatty and Cachar. Cholera in Cachar, otherwise public health good. Prices steady.

Mysore and Coorg.—Good rain throughout the State. Standing crops in good condition. Prospects of season favourable. Public health good. Cattle-disease prevalent in parts. Prices slightly risen in the Bangalore and Mysore districts.

Berar and Hyderabad.—Sprinkling of rain. Weather cloudy and hot. *Kharif* ploughings continue. Reaping of *rabi* crops continue. Prospects good. Cholera abated to some extent in almost all taluks. Cattle disease in Akola. Prices steady.

Central India States.—Weather hot, with strong westerly winds. Scarcity of water in Neemuch. Outturn of wheat in Sehore below average. Prospects continue good. Cholera abating. General health good. Prices rising.

Rajpootana.—Week almost rainless. Weather continues very hot, with high westerly winds accompanied with dust. Tanks and wells are very low. The *rabi* harvest is almost over, and *kharif* preparations are in progress. Sugarcane is being irrigated. Fever and small pox prevalent in places, otherwise public health good. Prices continue steady.

Nepal.—Thunder, showers, and sultry weather seem to betoken the beginning of the rains. Prospects fair.

Letters to the Editor.

PRESERVATION OF FLOWERS AND LEAVES.

TO THE EDITOR.

SIR,—Do you or any of your numerous scientific reader know any means or chemicals, &c., to preserve, say, for a wee or two, the leaf, bark, or flower of any plant in its natural stat so that it may not fade, or wither away ? Any information the subject will oblige,

M. C. CHAKRABARTI.

Tezpore, Assam, May 28, 1887.

EASILY PROCURABLE MANURES.

TO THE EDITOR.

SIR,—Koomar Gojendra Narayan should ask his cousin, tl Maharajah of Cooch Behar, to send him a consignment of Guai from Messrs. Ohlendorff and Co, whose business, I note from an a vertisement in your columns, has been taken up by Messrs. Cross an Donaldson, of the Lothian Manure works. But I am led to thi that experiments with guano, and other manures not procurab in India at a moderate price, are simply labour lost. Let tl Kumar carry on his experiments with oil-cake, nitre, crushed bone wood-ashes, dung, and above all, night-soil. In Europe there a considerable difficulties about utilising night-soil, as there are *mehters* there. But in India these difficulties do not exist.

There is one thing which has considerably discredited tl Agricultural experiments, and that is their unpractical characte Supposing you can, as an experiment, grow a fine crop with guan or rotten meat, do you believe that your example will be followed or do you think you would be inclined yourself to repeat your costl experiment ?

A MOFUSSILITE.

June 1, 1887.

NOTE.—We entirely agree with the writer of the above. There a scores of indigenous manures in India quite equal to any of the foreig artificial products. It is the want of enterprise to utilise these to tl best advantage that we deplore.—ED. *I. A.*

THE AGRICULTURAL DEPARTMENT OF BENGAL

TO THE EDITOR.

SIR,—Your suggestion that the agricultural scholarships shoul be awarded to none but the sons of zemindars and cultivators, mu have the support of all sensible men. In all parts of Bengal the are cultivators of large and small areas. The former are havin their sons educated in the Highest Schools and Colleges. I thin these may be found out without any great trouble, and the scholar ships awarded to the most deserving among them. I am not a officer employed in the Bengal Agricultural Department. I ca therefore impartially judge its worth, and I say, the attacks upo this Department, by the *Englishman* newspaper, is the meanes thing I have seen done by newspaper editors It is only two year ago that the Department was established, and I venture to say tha it is the noblest thing that Sir Rivers Thompson did during hi administration of Bengal. Rome was not built in a day, neithe did the *Englishman* newspaper gain its present position in month. Judging from the short time the Department has bee in existence, and the efforts at agricultural improvements (both i regard to machinary and crops) which it has put forth in the sa fussil, it has a more useful career before it than the newspaper afore said.

S. D.

TREES FOR STREET AVENUES.

TO THE EDITOR.

SIR,—Will you allow me to suggest, through your columns, to the municipal commissioners, the advisability of some attention being given to the planting of trees along the roads of this city. It is astonishing that the editor of the *Indian Agriculturist* did not notice, when operations were first started, that such a number of soft and brittle-wooded trees were being put out, nor did any of the superior officers of the Forest Department draw the attention of the municipal commissioners to the error. Had that body then consulted an individual who had a knowledge of our Indian timbers, we would not now be regretting the labour wasted and the ragged looks of the avenues in the principal thoroughfares. Take Dhurrumtollah for instance, where the flamboyant (*Poinciana regia*), *Millingtonia hortensis*, and a species of Acacia, out-number the hard-wooded kinds. The majority of the trees are brittle-wooded, and as a consequence, after every storm broken branches are strewn along the streets. In Wellington-square several specimens of these trees were uprooted during the last storm, and numberless branches were broken off in other places. Dhurrumtollah will never have an umbrageous avenue, and it would be the wisest course to cut down all trees that have been badly injured, and substitute others, such as "Jarool" (*Lagerströmia Regina*), "Bokool" (*Mimusops elengi*), "Neem" (*Melia Indica*), or "Jamun" (*Eugenia jambolana*), for these being of a wide-spreading growth, would, in after years, shade properly the wide footpaths of the broader roads. The present soft-wooded trees could be uprooted, and others of a more hardwooded species substituted in their place.

For the wide steets, such as old Court-House, Park, and Dhurrumtollah streets, I would recommend besides the above, the Mango, Jack, and country almond (*Terminalia catappa*), and for the lesser thoroughfares *Albizzia procera*, and *A. odoratissima*, *Dalbergia Sissoo*, *Mesua ferrea*, ("Nagkessur") and *Shorea robusta* ("sal") while, for Chowringhee, Circular road, and those round the *maidan* and across it, no better trees could be planted than *Ficus bengalensis* ("Bur,") *F. infectoria* ("Pakur,") and *F. religiosa* ("Peepul.") If these suggestions were carried out, the city would have decent avenues in 10 or 15 years, which would improve the older they grew, and not deteriorate, as a good part of the present ones will. The clumps of trees on the *maidan* will, after a time, look very irregular, as there are fast and slow growing trees hopelessly mixed up. The effect would have been fine if each species had been clumped separately.

I have no idea as to the depth of holes dug for the reception of the young plants on the footpaths, but from the slow growth they seem to make during their babyhood, should say they were not of any extent. A hole *at least* 30 inches deep and 18 inches in diameter ought to be excavated, so that the plants might have a good start, and if they were put down during the rains, very few would die. Nurseries could be made in the different public squares and the coolies who look after the squares could tend the nurseries as well Seeds of most of the kinds mentioned are procurable during the rains; but on no account should any more flamboyant, *millingtonia*, *kuddum*, Persian lilac, and other soft-wooded species be sown. If but one public-spirited commissioner were to interest himself in this matter, the visible results in three or four years would well repay him. According to the Hindoos, it is considered a very meritorious act to plant avenues and "topes" of trees, both for shade and fruit, to be enjoyed not only by the present, but future generations; their religion teaching them to care for those who will come after, and not to harbour the feeling, so prevalent among Europeans in this country, that as they are birds of passage and continually changing their residence, it is useless planting anything, as they wont enjoy the fruits. The natives never harbour such feelings, as the splendid avenues and large topes of trees so freely scattered through Western and Southern India testify.

I would also draw attention to the ruthless manner of pruning the lower lateral brances in vogue here. Some time ago I watched a party of Ooriahs, (*malees* I suppose they styled themselves,) told off for this purpose, operating on the trees in front of Messrs. Scott, Thomson and Co's office, in Government-place. Instead of using a small saw and cutting the branches off flush with the bark of the trunk, they were hacking away with "daos," leaving jagged and split stumps of all sizes and shapes. These wounds will gradually eat into the heart of the trees and destroy them.

The different species of trees mentioned by me will grow well in Calcutta, and belong to what the Forest Department style hard-wooded, or first-class timber. The native names are those known to most Bengalees, and the botanical ones are taken from Gamble's "Manual of Indian Timbers."

If the editor of the *Indian Agriculturist*, the Secretary to the Agri-Horticultural Society, or the Forest Department were consulted, they would, I am sure, give the commissioners any help that may be required, and at the same time bear me out in my opinions.

J. R. CRIPPS.

June 4, 1887.

NOTE.—The above letter appeared in the *Statesman*, and we reproduce it here as we are accused of not having noticed at the time the trees were planted, that they were mostly soft-wooded. When this was done the *Indian Agriculturist* was not edited by the present editor. But even if this journal *had* drawn attention to the fact, it is unlikely that the Municipal Commissioners would have adopted any suggestions for planting hard-wooded trees; for if they had any intention of doing things properly, there were many qualified gentlemen in Calcutta who would have gladly assisted them with advice.—ED., *I. A.*

Editorial Notes.

A WEEK or two back we had occasion to notice the experiments at Saharunpore with the Osage Orange plant, which is said to be largely used in America to feed the silk-worms upon. We have had some enquiries on the subject, in one of which the writer wishes to know why the leaves of any orange—or lime, or lemon for that matter—cannot be utilized for the purpose, as plants of this order grow to perfection in nearly all parts of India. We omitted to state at the time, that the Osage Orange does not belong to the Orange order, (*Aurantiaceæ*), but to the mulberry order (*Moraceæ*). This might not be generally known, and the name of the new silkworm tree is likely to mislead those not well up in botany.

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THE cultivation of Ceara rubber would not appear to be a profitable investment in Ceylon, for a Haputale planter, writing to a Ceylon contemporary, says:—"As to rubber cultivation, my advice to those intending to plant Ceara rubber is 'don't.' To those who have a large area under Ceara rubber trees only, my advice is let them grow, but spend nothing on their cultivation such as, on weeding. I have not yet found that it pays even the cost of tapping and curing of the rubber, and some of the trees in my charge are 5½ years old. We have the assurance that the trees give a plentiful supply of rubber when they are older, and I have no reason to doubt it. Meantime, I am not aware of its having proved a paying investment to anyone in Ceylon, by harvesting the rubber, therefore, I do not recommend its cultivation. It is my honest opinion, there are far too many acres under the product already, and as regards rubber, anyone with land suitable for rubber, would do better to select some other product."

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THE final report on the prospect of the wheat crop in the Bombay presidency for the current *rubi* season, shows the acreage to be considerably below that of last year; the figures being 3,096,427 for 1885-86, against 2,860,451 acres for 1886-87. Notwithstanding this decrease, the area under this important cereal was considerably above the average of the seven years beginning with 1880. The cause assigned for the falling off in the present season is that, with the exception of the Ahmedabad division of Guzerat, where the rainfall was deficient, the crops suffered from excessive and unseasonable rain in September in some districts, but generaly in November and December, which induced rust and thus reduced not only the acreage but the out-turn of the grain. The crops also suffered considerably from frost in January and February, while rats are reported to have done some damage by destroying the roots of the plants. Altogether the season was an unfavourable one for wheat in the Western Presidency. The yield has been estimated for the three British districts of Guzerat, Deccan, and the Carnatic only and amounts to 497,400 tons. No data are yet available as to the yield in Sind or the native States of Guzerat, Baroda Kattiawar, Cutch, and the Deccan States.

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WE publish in another column an interesting article on Ensilage, and entirely endorse everything the writer says as to the value of this fodder to India. We have consistently urged the extensive employment of this system of preserving grass and other crops at a time when they are plentiful, so that when the season of drought and scarcity arrives, there may be a plentiful supply of fresh and wholesome food for stock when

most needed. We cannot too strongly commend ensilage to the attention of all divisional and sub-divisional officers; for without their help, example, and teaching, the poor ignorant ryots are not likely to know anything about the matter. The literature on the subject is somewhat scattered, but there should be no difficulty for the Government to instruct one of its agricultural officials to draw up a plain and simple note, describing the various methods of making silage, and then to have it printed and circulated widely for the guidance of all district officers, impressing upon them, at the same time, the necessity of introducing the system in their several charges. By this means, we have little doubt that much good would result, and silos would become as common as hay-stacks in every village.

THE Southern States of America have been very much excited about a new fibre-plant said to be found in a wild state in Honduras only. At least so it is alleged. It is known there by the name of the "Pita Plant." The *New York Herald* published a glowing account of this wonderful plant, and the "thousand uses" to which its fibre could be applied. This, of course, set people thinking, and created what is known in Yankee parlance as a "boom." Upon enquiry it turned out that this wonderful 'Pita Plant' is nothing more than the *Agave Americana*, or common American aloe, found growing in wild luxuriance along either side of the East Indian and other railway lines. The fibre of this aloe has long been known in this country, and is utilized for various purposes, especially for door-rugs and ropes. That the fibre is susceptible of other and more dignified uses, we do not pretend to doubt, only we do not think many will agree in this country with the *New York Herald* that "handkerchiefs, laces, ribbons, false hair and wigs" can be made out of it. For further details we refer our readers to an extract elsewhere.

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THIS is how the *Civil and Military Gazette* describes a recent unsuccessful attempt to domesticate and 'home' the wild bees common to the Simla district :—"Last year, a criminal tribe, several thousands strong, was brought under the influence of civilization, and the superintendent of the Annandale Gardens. They had been collected with great care from a Native State, where they were leading a useless and unproductive life; and it was hoped—wrongly as events proved—that they would, under the benign influence of British rule, settle down to the paths of peace and decent living. On arrival of the mob at Simla, it was discovered that through insufficient commissariat arrangements, a large proportion of them had died *en route*, and the remainder were in an exhausted and emaciated condition—so weak indeed that they could not feed themselves. They were, however, supplied with food at the public expense by the kind-hearted Supereintendent. But no spark of kindly feeling was awakened in their breasts. They ate ravenously whatever was put before them, and their strength restored, fled silently, unobserved, to the desolate freedom of the hills whence they came, and whence their hive had been torn. The superintendent says ruefully :—'The general conclusion arrived at from these experiences is, that the bees common to the Simla district are not thoroughly domesticated.' "

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THE following remarks regarding the German jute industry are from *Kuhlow's Review*, and are interesting :—"Although the jute industry was introduced into Germany in the year 1861, it is only of very recent times that it has made any real progress. The new duties soon after they were instituted began to exercise a most beneficial influence on the industry, and the development since has been very rapid; for German goods are now judged to be inferior in no way to the Scotch productions, and find ready acceptance in the German markets, besides attaining a gradually increasing export trade. Last year jute and Manilla wefts having a weight of 51,400 kg, were exported. Besides pack-cloth, sacks, sail cloths, rope materials, &c., German manufacturers produce carpets, tickings, huckabacks, &c. Recently, too, one firm began to turn out a material to which the name of jute-velvet has been given, and which is made into furniture coverings, hangings, &c., and is even applied as tapestry. The last return of the Society of German Jute Manufacturers showed that there were 23 spinners and weavers in Germany possessing 57,126 spindles and 2,250 looms. There are, besides, a number of hand and machine loom owners who have not spinning power. And as a number of new companies have recently sprung up, not to speak of enlargements, since the above returns were first issued, the number of spindles may now be represented at 70,000, having a total production capability of 600,000 d. c. The imports of raw jute alone, which have more than doubled during recent times, would serve to indicate the development the industry is experiencing."

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WE publish this week the utterances of the gentlemen composing the Bengal Chamber of Commerce on the subject of the wheat trade of India, with special reference to the charge brought against the exporters, of permitting a system which offers a premium upon adulteration by up-country traders and middlemen. Mr. Petrie was not quite happy in his attack upon Government in this matter, inasmuch as the latter is only too ready and willing, we believe, to do all in its power to help the trade. Otherwise the anxiety displayed by its officers in this connection would be unaccountable. Another weak point in Mr Petrie's address was his reference to the number of firms that had retired from the business of exporting wheat, because "they were not able to make it pay its way." This statement is not quite reconcilable with the fact brought to light by the latest trade returns, from which we gather that the exports of Indian wheat increased from about $1\frac{3}{4}$ million cwts., valued at nearly 492 thousand pounds in 1874-75, to over 22 million cwts., in 1885-86 valued at over 8 million pounds. With these figures before us, it is difficult, we say, to fit in Mr. Petrie's remark that the wheat export business yields no profit. To ordinary minds, this argument will naturally appear to be opposed to the first principles of trade; that any firm or firms should continue to carry on such an enormous business steadily for over ten years without any profit seems almost incredible. We are ready to admit that difficulties do exist in the way of shed accommodation at the Howrah station; but this does not prove that these drawbacks are insurmountable, or that the wheat business is a losing one.

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THE *Civil and Military Gazette* hears that the French Government has deputed M Ussèle, Garde General of their Forest Service, to study the question of forestry in India. M. Ussèle was expected to arrive early this month probably in time to learn something about forest conservancy during the hot weather, and the difficulties attendant upon the work when fires have to be guarded against. It is to be hoped that the Government of India will give the French expert full opportunity of appreciating the trying duties of the Indian Forest officer during this anxious season We fear that this part of our visitor's work cannot be made pleasant for him with the thermometer ranging well over 100° in the shade, but otherwise the Government and the service will doubtless do all they can to make M. Ussèle's tour as comfortable and instructive as possible. It is only by showing everything we have to show that we can learn what other people think of us and our methods, and this is of particular importance as regards a comparatively young department. Moreover, Indian forest officers who have from time to time visited France, Germany, and more lately, Austria and Hungary, have received, in those countries, not only great hospitality and consideration, but have had the most complete arrangements in the matter of tours, so that they might see all that was worth seeing in the shortest possible time.

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THE fast steamers between New York and Liverpool have accomplished some remarkable passages, and the two countries have been brought almost within 'speaking distance' as it were, of each other. But the most remarkable feat was that performed by the *Etruria,* whereby roses cut in New York on April 2nd, were exhibited at a meeting of the Floral Committee in London, on the 12th idem *in a perfectly fresh state.* The *Gardeners' Chronicle* writes in this connection :—"The most remarkable exhibit at the last meeting of the Floral Committee, on the 12th instant, consisted of some cut blooms of Tea Rose *Puritan*, which left New York on the 2nd instant and arrived in the docks at

Liverpool at 2 A. M. on April 11th. A messenger was awaiting their arrival, who having secured his prize, left Liverpool by the 3 A.M., express, and delivered the roses to Mr. William Pau at Waltham Cross, at 10 A.M. We commend this little history to members of the Cobden Club, to Protectionists, Free Traders and Fair Traders, as a nice problem in political economy Here is a British rose-raiser (Mr. Bennett), who raises a beautiful rose, and, doubtless, for a consideration, sends it on of the country. Another rose raiser re-imports it in the form of cut blooms, having doubtless in his turn made some commercial arrangements with the American growers. But while the economists are discussing this question, is there not just a shade of a fear that the English flower-forcer may once more be beaten out of the market by the foreigner ?—that is, if we are to consider the Americans as foreigners. Poor British grower ; he gets no more than one half-penny a pound for his tobacco, and New York competes with him in the matter of cut roses. In any case, it was a remarkable feat."

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SOME idea may be formed of the unprofitable nature of wheat cultivation in the United Kingdom, from the following facts brought to light by Mr. Samuel Rowlandson, a well-known Yorkshire agriculturist, in a paper contributed by him to a recent issue of the *Journal* of the Newcastle Farmers' Club :—In 1878, he estimates the cost of wheat per acre, after fallow, as follows :—Two years' rent £2 ; four or five ploughings £2 ; four harrowings, including dragging and rolling, 10*s* ; drilling, 1*s* ; seed, 12*s* manure, 12 loads at 4*s* and laying, £2 8*s* ; spreading and hoeing, 2*s* 6*d* ; tradesmen's accounts, 3*s* ; tithes, 3*s* 6*d* ; rates 4*s* (two years) ; harvesting, and marketing, £1, interest on capital 13*s* 9½*d*, total, £9 17*s* 9½*d*. After a crop of clover the cost was naturally less, and amounted per acre to £6 10*s* 7*d*. The average cost, arrived at by adding these two results together and dividing by two, was £8 4*s* 2*d* per acre. The result in 1878 was a yield of 25 bushels per acre, and the receipts were £6 17*s* 6*d*, or a loss of £1 6*s* 8*d* per acre. Mr. Rowlandson's average receipts per acre of wheat were, for the ten years 1869 to 1878, £8 5*s* 9*d*. In 1886, after fallow, the cost of cultivation was somewhat less than in 1878, owing to deduction in rent and price of labour Two years' rent per acre amounted to £1 10*s* ; four or five ploughings, £1 10*s* ; four harrowings, including dragging and rolling, 9*s*. drilling and seed, 10*s*; 12 loads manure, at 3*s*. 9*d*, £2 5*s* ; spreading and hoeing, 2*s* 6*d* ; tradesmen's accounts, 3*s* 6*d* ; tithes. 3*s* 6*d* ; rates 3*s* ; harvesting, 15*s*; interest on capital, 11*s* 4*d* ; total, £8 2*s* 4*d*. After a crop of clover the cost was estimated at £5 2*s* 6*d*. The average cost of the two systems was £6 12*s* 4*d*. In 1885, when he had twenty-seven bushels per acre, he realised £5 12*s* 10*d* per acre, and his average receipts for the seven years, 1879 to 1885, was only £5 3*s* 8*d*. In fact, Mr. Rowlandson calculates his average loss for the seven years, as £1 8*s* 8*d* per acre, on wheat.

A LOCAL daily paper understands that, at the invitation of the Agricultural Department, Messrs. Balmer, Lawrie and Co. recently sent to Doomraon a set of Messrs. Marshall's thrashing machinery, and arrangements were made beforehand with the *raj* for the purchase of about 100 tons of unthrashed wheat, it being Messrs. Balmer, Lawrie and Co.'s intention to thrash and clean this at Doomraon, in order to export that quantity, in a practically clean condition, direct to the home market, and so test its true value, as compared with the wheat generally exported, containing the customary 5% refraction of dirt and other extraneous matter. Unfortunately for the success of this experiment, the Dewan of the Raj of Doomraon was unable to purchase a sufficient quantity of unthrashed wheat for the purpose, owing mainly to the lateness of the season, and the fact of the wheat having already been thrashed in the usual native fashion of treading out by bullocks. Experiments were, however, made to a limited extent, and the dirty grain, previously trodden out by bullocks, passed through the machine whence it was delivered in a perfectly clean state. The samples of unthrashed wheat being also available were similarly treated with an equally successful result. It appears, however, that in the Doomraon and Buxar districts, wheat is sown with other grain, with the object that, if one crop fails, the cultivator has recourse to the other, to return him a livelihood. Wheat thus grown renders the thrashing an extremely difficult operation, and to ensure the perfect success of steam thrashing machinery, wheat should be grown as a separate crop, which, we believe, is the case in the Punjab, Guzerat, and in other districts in the Bombay Presidency. Samples of ordinary cleaned and machine-cleaned wheat have been sent to the Secretary of the Agricultural and Horticultural Society for inspection, and we believe the machine-cleaned sample has been most favourably reported upon.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 2nd June, 1887 :—The rain-fall has been general throughout Bengal, Assam, and Mysore, and the falls in some districts of the first-named province, and in one district of Assam were very heavy. Showers have also occurred in parts of Madras, and in a few places in Bombay and the North-Western Provinces and Oudh. Elsewhere the week has been rainless. In Burmah there was general rain during the week ending 25th May. No report has been received for the week under notice. Ploughing and sowing for the *kharif* continue in Bombay, the Central Provinces, and Berar, and has commenced in Rajpootana and in some districts of the North-Western Provinces and Oudh, and the Punjab. Sowings are advancing in parts of Bombay, the North-Western Provinces and Oudh, and the Punjab. The standing crops in Madras, and Mysore and Coorg are generallly good, and the outlook is favourable. The early rice in Bengal and Assam is in good condition, but more rain is wanted in the eastern districts of the former Province. Rice sowings have also commenced in the Central Provinces. Sugarcane cultivation is progressing in the North-Western Provinces and Oudh, Assam, and Rajpootana ; and the crop is doing well in Bengal and the Central Provinces Indigo is in good condition in Bengal ; in the North-Western Provinces and Oudh the crop is being irrigated. Cholera is still prevalent in some districts of the North-Western Provinces and Oudh, but has abated in Bengal. Elsewhere the public health is generally satisfactory. Cattle-disease chiefly exists in Madras. Prices are rising in two districts of the Punjab, and in three districts of the Central Provinces, and have slightly risen in the Bangalore and Mysore districts. They also show an upward tendency in the North-Western Provinces and Oudh. Elsewhere prices are fairly steady.

WE publish this week the proceedings of an important meeting held on the 2nd instant, having for its object the formation of a new association for developing the consumption of Indian tea in India. It has doubtless occurred to others, as it has to us, that while strenuous efforts were being put forward to find outlets for our teas in foreign markets, so little attention was directed to develope a market for these teas in this country. It is a curious commentary upon the enterprise of our great mercantile houses that such a market should so long have been left undeveloped. This will be better understood from the following facts :—The last circular of the Indian tea Association, dated March 1887, estimated the outturn of the Indian crop for the current year at a little over 85 million lbs. Of this quantity only 1,500,000 lbs. was calculated as "the requirements of the Government and the local consumption of Northern India." The population of India is reckoned at 250 millions. Now, by dividing 1½ million lbs. among 250 million people, our readers will have a fair idea of the amount of Indian tea consumed by every inhabitant of this vast Empire. With these facts before us, we repeat that our astonishment at such a market being so long neglected is only heightened by the folly which refuses to look "nearer home." It is a matter of constant surprise to those outside the 'magic ring' of the Indian tea trade, that while the *wholesale* price of some of our really good teas at the recurring auction sales rarely exceed three to four annas per lb, the *retail* price of the same is somewhere about Rs 1-4-0 to 1-8-0 per lb. This being so, can it be wondered at that the natives of India have not been converted into a nation of tea drinkers ? Even in London, superior pekoes are sold at about 9*d*, or 6 annas (exchange at

1s, 6d.) per lb., while in Calcutta, ordinary pekoes worth the name, cannot be had for anything under Rs. 1-4-0 per lb. It is therefore with much satisfaction we learn that the intention of the new association is to bring Indian tea within the reach of every villager by opening agencies within the limits of the smallest village where a shop exists,and where small packets of 1, 2 and 4 ounces are to be sold. But we may be allowed to remark that the prices at present fixed for these packets, viz. 9 pice, 1½, and 3 annas each, respectively, are too high, being at the rate of 12 annas per lb. We fear these prices will fail to reach the ordinary villager, or even men better circumstanced. To get at the masses, prices must be fixed sufficiently low to suit their means. If the association succeeds in developing a taste for tea among the millions of India, this industry will receive an impetus the like of which it has never yet experienced. In another column will be found an article on this subject from the columns of a local contemporary.

REVENUE SETTLEMENTS IN THE MADRAS PRESIDENCY.

Settlement operations in this country are carried out in a most erratic fashion. In some instances, the revenue has been assessed at absurdly low rates, entailing very considerable loss to the State. In others, the assessment is so high as to make it a positive hardship to the cultivator, or landholder. Again, settlements have been unwisely made for periods so long, and at rates so low,as to merit condemnation from all thinking minds; while in others,the period is too short to induce landholders to lay out capital for improvements. But it was left for the Madras Government to make an altogether new departure in the matter of revenue settlements. In illustration of our meaning, we take the following quotation from the Madras "Manual of Administration," and ask the careful attention of our readers to it:—"The term of the Madras ryottwary settlement is, according to the present intention of Government, thirty years from the date of the completion of each particular local settlement, at the end, of which time not only the commutation money rates, but the grain values themselves, now assigned to the land are liable to revision."

Let us examine this statement. Firstly, it is forcibly brought home to us that the only security that the ryot in Madras has of any fixity in the rate of his assessments, is the *intention* of Government. Under such a condition we have only to imagine a slight change in the Government, and a time of financial pressure in the State, and immediately some one may arise, and say "let us revise our land settlements, the commutation rates are all absurdly low, and the productiveness of the soil has been vastly increased"! At a stroke of the pen every wretched holder may find himself called upon to pay double or treble the sum he has hitherto been doing. Such apparently is the condition of land tenure under the Madras Government. This revision may take place when the *intentions* of Government alter; in fact Government reserve to themselves the right of demanding any price they see fit from the tenants for the land they hold. The tenant has absolutely no security, for even what was currently supposed to be the duration of a settlement, except the selfishness of the Government. The Government of some particular time may, however, think it better or be driven by extraneous causes to kill the goose, instead of only looking to the eggs. The Madras ryot is, on the showing of this quotation, simply a tenant at the will of the Government for the time being. For the nominal thirty years of the settlement, he has no security now; that is, no security which is tangible. The "intentions" of one Government may be discarded by the next, and the ryot, as usual, will go to the wall. It seems to us that the "intentions" of Government ought to make way for a good sound legal security, that once an assessment is made, it shall not be tampered with during the continuance of the settlement be it 10,20, 30, or 100 years.

But there is another point to which we must allude, that is brought out by the quotation we have given. The grain values now assigned to the land are liable to revision. Even supposing that the "intentions" of Government carry them through all their temptations to tamper with the settlements made, during the 30 years of their supposed continuance, this condition cuts at the feet of all that security of tenure which is required to encourage the tenant to invest money in the permanent improvement of his holding. We hold, and we think that our position will be accepted by most persons who study the subject from an independent point of view, that the state is only entitled to make a charge for the use of the land according to its *natural* productiveness. Let us call this "fertility." Any added productiveness is the property of the tenant. Let us term this "condition." The object of a settlement is to determine the relative fertility of the soils of a district, and to allot grain values to them. Without entering here on any criticism of the systems adopted in determining the "fertility" of the land by the settlement department, and assuming that the result is a fair approximation to the object desired, we ask how, in justice, can the State proceed to set aside this determination of the fertility of the soil? As a matter of fact, the proviso we are now commenting upon leaves open a door for the unscrupulous attachment of such "condition" as the energy, enterprise and capital of the tenant may have added to the land he holds, for it is not possible that the State can, except in extreme cases, add to the "fertility" of the soil. If it does do so in any special cases, it can easily protect itself, *e.g.*, if it carries out a system for providing irrigation water, it can charge for the benefit supplied. Roads and railways may benefit the ryot indirectly, but he has a right to expect such being provided for him in return for what he contributes to the general revenues of the country. Under no circumstances is the landlord entitled to seize and turn to his own benefit the value of his tenant's labor and capital, and we can see no justification for the proviso alluded to above. Not only do we believe it unjust, but we believe it to be unwise to retain such a proviso. The Indian tenant is too slow already to invest capital in the improvement of his lands; if he means that such investment only renders him liable to further and increased taxation, he will be likely to remain quiescent, and trust solely to the fertility of his holding to carry him along. Fertility alone will not combat famine. The prevention of famine is now one of the chief objects of the Madras settlement department,for it is one of these combined agricultural and settlement Deptpartments which Mr. Buck has given to India. If we are to trust to fertility, our food supplies must year by year become less and less adequate for an increasing population. In the olden times, when the population was relatively small, and only the richest lands were brought under the plough, fertility sufficed to provide for the wants of the people. Now, and in the future, if famines are to be things of the past, and to become impossible, we must improve the condition of our land, and thereby increase the produce (grain value). If we are to hope that this may be done, we must place the tenure of land on a sound and secure basis, and in Madras, until the heresies to which we have alluded are cast off, no efforts, no energy, no expenditure of money, can really be expected to lead to any improvement in the agriculture of the country. We consider that, 1st, a settlement once made should be absolute for thirty years at least; 2nd, at the end of that term it should be subject to revision, so far as regards the commutation money rates only. If this were the condition of land tenure in the Southern Presidency, the ryot would have a sound and tangible security from all oppression. It would be just to the ryot, and fair to the State. It might be expected to encourage the investment of capital in the land, and to foster agricultural improvement. Is it too much to hope for?

WHEAT CROP, BOMBAY PRESIDENCY, 1887.

[Official Paper.]

The final report, dated 30th May 1887, on the prospects of the wheat crop in the Bombay Presidency, is as follows:—

Gujarat.—*Ahmedabad.*—The area under wheat was 200 acres, out of which about 28,000 acres were irrigated. The tracts of Dolka and Dhandaka are the chief wheat talukas. The area is slightly below average and considerably below that of last year. There was a decrease of about 18,000 acres in Dolka, alone, where the October rainfall was deficient. The crop was more or less affected in nearly every part of the district by frost early in February, and suffered from rust, brought on by the excessive cold, and from grubs. The yield is below average and reaches only 8 or 9 annas. *Vajia*, or irrigated, is the only variety exported to Bombay for the foreign market.

The quantity sent down to Bombay is less than last year, the total export by sea from Dhobra, Bhavanagar, and Gogo, from the middle of March till the close of April, being about only 770 cwts. Of the total area under cereals *jowar*, *bajri* and wheat last season occupied, respectively, 25 per cent; the remaining quarter was under rice, *nagli*, *kodra*, &c. The outturn of the *kharif* crops was more or less affected by the failure of rain in September and October. The yield of *jowar*, *bajri*, rice, &c., was reported to be on an average not above 8 annas.

Broach.—The area was about 93 000 acres, which is above both the average and that of last year. Jambusar and Vagra are the chief wheat talukas, with 32,000 acres each. The wheat is all dry crop locally known as *hansia*, and is in much demand for local consumption. Injury from frost and rest has reduced the average yield for the district to about 6½ annas. About, 7,500 cwts, of wheat were exported by sea to Bombay from the middle of March till the close of April. There has been a large export from Hansot also, but this is evidently to the adjacent district of Surat, where this wheat is in great demand. *Jowar* is the chief creal grown. The crop was good in one and fair in three talukas.

Surat.—The area is 30,000 acres, that is, nearly up to last year's, and just above the average. As in Broach, the wheat grown is all dry crop. Olpad, Bardol, and Mandvi are the three chief wheat talukas of the district. Very little wheat is grown in the south. The crop was more or less injured by frost and rust. The average yield is reported to be 7½ annas. The *kharif* season was on the whole good, and *jowar*, the chief cereal crop of the district, was excellent. The area under this cereal was more than in the previous year. The export of wheat from Surat to Bombay is very small, the total from the middle of March to the close of April being only 635 cwts., as wheat is the staple article of food amongst the upper classes of the local population.

Kaira.—Total area is about 29,000 acres, of which 27 per cent is under irrigated wheat. Matar, the chief wheat taluka, contains alone more than half this area. Here the crop was fair. Injury from frost and fogs was reported from other talukas. The average yield is 6¾ annas for dry and 8½ for irrigated wheat. Very little wheat is exported to Bombay. *Bajri* the staple food crop of the district, was estimated at 12 annas.

PanchMahals.—Area is about 12,000 acres, of which the bulk is dry crop. Nearly the whole area is in Jhalod and Dohad. Owing to want of sufficient moisture in the soil, the crop in these talukas was only moderately good. There was slight injury from frost in other parts. The average yield is estimated at 7¾ annas. The *kharif* crop—*bajri*, maize, &c.—turned out well. There has been little export, and that from Jhalod and Dohad only

Deccan.—*Nasik.*—Area, about 300,000 acres, is below last year, but above the average. The area under irrigated wheat is about 27,000 acres). The decrease is due in parts to more land being devoted to linseed, and in others to more extended sowing of the *kharif* crops. The chief wheat talukas are Niphad (75 000 acres). Nasik (45,000 acres), Dindori (55 000 acres) and Yeola (30,000 acres) Injury from rust is reported from all parts of the district. The irrigated wheat has suffered more than the dry crop. The average yield of the latter is reported to be 10 annas, and of the former 7½ annas. In Maligaon the wheat grown is only just sufficient for local consumption, and in Nasik, too, the wheat is stored for local use. It is exported from most of the other parts of the district. *Bajri* is the chief food staple of the district. The rain in September and October was excessive and proved injurious to *bajri* in almost all the talukas. The *jowar* crop was middling.

Khandesh.—The area, about 325,000 acres, though below last year's, is about the average. The bulk of the wheat is dry crop. The chief wheat talukas, laying along the Tapti, are Shahada (56,000 acres), Nandurbar (37,000 acres); Sindkheda (31,000 acres); Amalner (24,000 acres) and Taloda (21,000 acres). The decrease, as compared, with last year is due to a better season for *kharif* crops under which accordingly a large aria was placed asin Nasik. The crop was somewhat affected by intense cold and by prevalent westerly winds stunting the grain. The average yield is about 11 annas for both dry crop and irrigated wheat. Wheat is exported from most parts of the district. *Bajri* and *jowari* are the chief food crops of the district. The season was on the whole a good one for them, but more or less injury to the former was caused in several talukas by rain as lay out in the field.

Ahmednuggur.—The area is about 224,000 acres, or less by about 24 per cent. than last year. The irrigated area is about 30,500 acres. The chief wheat talukas are Kopargaon (70,000 acres), Nevasa (31,000 acres) and Parner (24,000 acres). There is a large decrease almost everywhere owning to the more favourable season for the sowing of early crops. In Kopargaon the decrease is nearly 40,000 acres. The crop was affected more or less by rust everywhere, the irrigated variety more than the dry crop. The average yield is 6½ annas for the former, and 8¾ annas for the latter. The export of wheat is less then last year. *Jowari* and *bajri* are the chief staple food crops of the district. Damage, especially to *bajri* by heavy rains, particularly when the crop was reaped and stacked, is reported from several parts.

Poona.—The area is about 108,000 acres or about 5 per cent less than last year. The area under irrigated wheat is about 23 000 acres). The chief wheat talukas are Junnar (32,000 acres), Khed (17,000 acres), Mawal (14,000 acres), and Haveli (1,000 acres). The crop is affected by rust in several talukas. But the injury to dry crop wheat is general, but partial only as regards the irrigated area. The average yield is 9½ annas for dry crop wheat, and 10¾ annas for irrigated wheat. The export is reported to be less than last year. The heavy but untimely fall of rain at the close of the monsoon slightly damaged *bajri* and *jowari*., the two most important food crops of the district.

Satara.—The area is 70,000 acres, that is, slightly less than last year. The taluka with the largest area under wheat is Khatal (12,000 acres.) Irrigated wheat occupied about 23,000 acres. Rust brought on by heavy, November and December rain, is reported from several parts. Injury to dry crop wheat was greater than to the irrigated wheat. The average yield of the former is 8½, annas, that of the latter 11¾ annas. The crop scarcely, on the whole, came up to the average. Other cereals which form the staple food of the country yielded a fair harvest all over the district.

Sholapur.—The area is 59,000 acres, that is nearly up to last year. The area under irrigated wheat is 35,000 acres. Dry crop wheat has in greater part of the district suffered from rust caused by untimely rain. Damage from rats is reported from Madha. The average yield is 5½ annas for dry crop and 10 annas for irrigated wheat. Wheat is being exported to Bombay and Madras. The untimely heavy fall of rain in September and October slightly injured *bagri*, and *jowar* is middling.

Karnatak.—*Dharwar.*—The area is about 241,000, or about 39 per cent, above average. The chief wheat talukas are Navalgund (98,000 acres), Gadag (47,000 acres), Dharwar (33,000 acres), Hubell (29,000 acres), and Ron (27,000 acres),. Little or no area is under irrigation. The wheat grown in the district is hard red which in places is of excellent character for export. Rust is reported from several parts, and the average yield is said to be 8½ annas only. Wheat is largely exported from the chief talukas growing it, which lie along the Southern Mahratta Railway. *Jowar* is the chief food crop of the east and centre, and rice of the west of the district and the yield of the former is estimated at 10 annas, and that of the latter being less.

Bijapur.—The area is 170,000 acres. The area under irrigated wheat is only about 2,000 acres. Wheat is grown all over the district, but the largest area is in Bagewadi taluka (37,000 acres). Rust to a greater or less extent is reported from all parts, especially in black soil and riverside villages. In parts of Sindgi, Bagewadi, and Muddebihal the crop was slightly damaged by rats. The average yield is reported to be not more than 6 annas. What is being exported from the northern parts, and in Bijapore nearly the whole produce is said to have been exported. The chief food crop is *jowar* and it yielded on an average a 10-anna crop.

Belgaum.—The area is 100,700 acres, or neaely equal to last year's. Irrigated wheat occupied only about 3,000 acres. The chief wheat-growing talukas are Parasgad (45,000 acres), Athni (20,000 acres). and Gokak (16,000 acres). Rust, brought on by rainfall after sowing and by westerly winds, was reported to have affected the crop in several ta'ukas The average yield was reported to be 7½ annas. Wheat is exported from Gokak and Sampgaon Owing to want of seasonable rain in July and August, the yield of *jowar*, the chief food crop of the district, was only middling.

Sind.—*Shikarpur.*—The area is 135,000 acres, or 20 per cent. less than last year. The area under irrigated wheat is reported to be 52,000 acres. The dry crop area includes the flooded lands. The decrease over last year was due to deficient water-supply. Severe frost and unseasonable wind reduced the yield from 10 to 12 annas. The export trade has not commenced. *Jowar* and *bajri* are reported to have yielded above an average crop.

Upper Sind Frontier.—The area is about 35,000 acres, or 12 per cent. less than last year. The decrease is due to insufficient water-supply. In some parts there was injury from frost. The yield is, on the whole, about 12 annas.

Thar and Parkar The area is 14,000 acres. In spite of severe frost, the crop is reported to be promising and estimated at 12 annas.

Hyderabad.—The area is about 31,000 acres—that is, nearly up to average, and to that of last year. Of this 56 000 acres are under irrigation, The crop was in parts damaged by frost, The yield is said to be 12 annas, *Jowar* and *Bajri* yielded a good crop.

Karachi.—The area is 39,000 acres, or nearly up to both the average and to last year's figure The crop was somewhat damaged by frost, so the yield was estimated at 11 annas only.

NATIVE STATES.

GUJARAT.—*Baroda.*—The area returned is 98,000 acres, of which about 70,000 acres are in the Kadi Mahal in North Gujarat. The irrigated area is, reported to be 63,000 acres, almost the whole of which is in Kadi. In this division rust is reported to have prevailed, but the crop is, nevertheless, a good one, and the yield is estimated at 12 annas. In the Baroda and Navsari Divisions the crop is middling and is estimated at 8 to 9 annas.

Kathiawar —The area is about 249,000 acres. Jhalavad has 74 000 acres, Halar 83,000, Gohilwar 61,000, and Sorath 29,000 acres. Nearly half of the total is under irrigation, Injury from frost is reported from parts of Jhalavad and Halar, but the yield there is, nevertheless, said to be not less than 12 annas.

Kutch —The area is about 21,000 acres, of which nearly the whole was under irrigation The yield is reported to be 8 annas. The produce is not sufficient to meet local demand.

Other States.—The area is about 100,000 acres. Palhanpore has 37,000 Mahikantha 36,000, Rewakantha and Cambay 15,000 acres each, and Surat States 870 acres. In parts of Palhanpur there was slight injury from frost; in Mahikantha the crop was fair and the yield is from 8 to 11 annas;in Cambay 11 annas; in Rewakantha and in Surat States the crop is fair.

Deccan—Satara Jagirs.—Area 18,000, and Akalkot 6,000 acres. In the States of the Satara Jagirs the dry crop wheat was injured by rust; the irrigated wheat was good. In Akalkot the crop was poor.

Southern Mahratta—Kolhapur States.—The area is about 13,000 acres, or nearly up to last year. Rust was repoted from several parts. The yield was 8 to 9 annas. The produce is hardly sufficient for local consumption. The *jowar* crop is estimated at 8 annas.

Other Southern Mahratta States.—Area about 100,000 acres. Sangli has 22,000, Jamkhind 19,000, Mudhol 20,000, and Ramdurg 16,000 acres. The remainder is scattered among other minor States. Rust is reported, from several parts, and the yield is everywhere below 10 annas.

Khairpur (Sind).—The area is 36,000 acres or nearly equal to that of last year. Crop was much affected by severe frost and unseasonable wind. The yield is reported to vary from 6 to annas.

Resumé.—The total area under wheat in the whole Presidency is returned at about 2,860,015 acres, against 3,096,427 acres in the previous year. The average area under wheat duing the past seven years, commencing with 1880 was 1,883,311, excluding the Native States, for which no figures are available. The total out-turn has been estimated for the three British districts of Guzrat, Deccan and the Karnatic only at 497,402 tons, no data being available for calculating the yield from the British district of Sind, and the Native states altogether.

A NEW TEA ASSOCIATION.

It must appear strange to the uninitiated that, while those interested in the tea industry of India were making strenuous efforts to find new markets for our teas in foreign countries, no steps of any kind had been taken to promote its more extensive consumption in this country. It is therefore satisfactory to find that attention has been aroused in this direction, and a meeting of those interested in the trade was called and held at the office of the Tea Brokers' Association on Thursday afternoon, the 2nd instant, to consider a proposal for the formation of a company to be called the 'Calcutta Association for the encouragement of the consumption of Indian tea in India.' The intention being to raise the required capital,—which is not to be very large,—by shares of Rs. 10 each, no shareholder to hold more than one hundred shares. Messrs. Lyall, Marshall and Co. of this city have under-taken the working of the scheme.

By 3, P. M., some 35 gentlemen had assembled, when Mr. Simpson proposed that Mr. Lyall, of Lyall, Marshall and Co., be voted to the chair, which was carried.

Mr. Lyall then rose and read the memorandum calling this meeting, and said that the objects named therein could only be regarded as preliminary; that this meeting was called to discuss and decide upon something definite. The first point to consider was whether the scheme now under consideration approved itself to the tea trade of Calcutta, and secondly, what support it was likely to receive from that community; and thirdly, to elect a practical committee to work it out. As to the first point, he had received letters from many influential gentlemen in the trade who heartily approved of the scheme, and were anxious that it should be carried out to a practical end. He thought the time had arrived to look for new markets for our teas, but that while we were looking for these outside, we had been neglecting a very profitable market at our very doors. These had never been tested; but he felt sure that if properly placed before them, the masses in this country would readily acquire a taste for, and use our Indian teas. That if sufficient interest was taken to develope this trade, he had no doubt it would extend. There were some present at the meeting who would like to see less of our tea going out of India. He was aware that there were difficulties in the way of introducing these teas throughout the country, but they had met on this occasion to devise means to overcome them. The speaker here read the following extract from the *Overland Ceylon Observer* of May 21, 1887, which had been circulated by the Indian Tea Association, to its members:—

"*Tea.*—Mr. Whittall, representative of Messrs. Matheson & Co., London, left to-day by the B. I. S. N. Co.'s Steamer *Chyebassa* for Madras, *en route* to Coorg and the adjacent planting districts, Mr. Whittall, who had long experience in tea in China, and who some years ago did not, we believe, regard the Ceylon tea enterprise very favourably, is now inclined, we learn, to anticipate an export within a few years far in excess of any figure we have yet ventured to put forward—70 to 80 million pounds of Ceylon Tea exported in a year. Say 1891-92,—would certainly bring this colony into prominent notice, and if Uva is to have her due share, in making up this quantity, how in the world is she to manage for transport, is a question which may well be asked on her behalf, and dinned again and again into Downing-Street ears. A gentleman of much experience in India on tea and other products, tells us that he has never seen tea anywhere for growth at its age, to equal that which he saw in Udopussellowa, and that he recognised at once beyond Newara Eliya, the climate and fine soil peculiar to the very best Indian planting districts. Of course it remains to be seen who are to consume the 80 million pounds Ceylon tea, and whether they will pay for it at a remunerative rate, must depend upon new fields being opened, and it is satisfactory to learn that steady progress is making in America, Italy and France in the sale of good tea."

Mr. Lyall went on to say that when he was in Ceylon, he did not think there was any prospect of that colony producing more than 40 million pounds at the very out-side; and how it was to turn out 80 million pounds did not appear quite clear to him, especially in view of the many demands on the land. But be that as it may, that was not the point for consideration; a suggestion had been made to him to ask the meeting whether this scheme, as far as it had gone, had the approval of those present, and whether any one had any suggestions to make. Mr. McTavish here proposed, seconded by Mr. Waller, that this meeting heartily supports the scheme, and that the members of the tea trade were ready to forward it. Mr. Simpson suggested that a working committee be formed to give effect to this scheme, to be composed, as follows, with power to add to their number:—Sir Alexander Wilson, Messrs. Watson, Waller, McNair, Griffiths, McTavish, McKinnis, Play-fair and Lyall. Mr. Lyall then said that he had received a letter from the Secretary to the Indian Tea Association, stating that the association was ready to assist the scheme pecuniarily, to start it. Mr. Lyall suggested that the thanks of the meeting be conveyed to the Tea Association for this offer. After some further discussion, the following Resolutions were unanimously adopted:—

(1) That this meeting approves generally of the scheme for developing the consumption of Indian tea in India.

(2) That a committee be elected to work out details of the scheme, and to draw up and circulate a prospectus.

(3) That the following gentlemen be elected members of the Committee:—Sir Alexander Wilson, Messrs. Watson, Waller, McNair, Griffiths, McTavish, McKinnis, Playfair and Lyall.

(4) That the thanks of the meeting be conveyed to the Indian Tea Association for their offer to contribute towards the expenses of the scheme.

We may add here that several shares of the new Association were taken up at the meeting, which separated after a vote of thanks to the chair.

THE INDIAN WHEAT TRADE

The annual general meeting of the Bengal Chamber of Commerce was held on the 25th ultimo for the purpose of adopting the report of the Committee for the past year, which corresponds with the Official financial year ending on March 31st. On this occasion some important speeches were made, and among them that of Mr. Petrie, on the wheat trade of India.

Mr. Petrie spoke as follows:—

Mr. President and Gentlemen.—I trust you will allow me to occupy your attention for a little time with some remarks addressed more particularly to those members of the Chamber who, like myself, are interested in the Wheat and Seed Export Trade. There are three subjects on which I wish to say a few words, viz:—

(1). The debit and credit system of levying demurrage at Howrah, and the necessity for increased shed room at that staion.

(2). The injury done to the trade by the encouragement given to petty traders by the reduction of special rates to consignments of 10 tons.

(3) The standard of 5 per cent refraction in wheat.

The subject of the accommodation at Howrah, and the vexatious demurrage rules in force there, had engaged the attention of the Committee for the last seven or eight years almost whithout intermission, and when at the commencement of last season, the Agent of the East Indian Railway announced that he was prepared to adopt the debit and credit system of levying demurrage, the Committee thought their exertions had met with success. Their self-congratulation was short-lived, however, for though the system worked admirably and gave unqualified satisfaction to the Railway Company and merchants alike, it was after three month's trial discontinued at the instance of Government, and though the Committee telegraphed to the Public Works Department at Simla, and subsequently memorialised the Viceroy, protesting against the action of Government and praying for a reintroduction of the debit and credit system and extension of accommodation at Howrah, it was not until the return of Government from the hills in November that the Committee, with the assistance of the Hon'ble Robert Steel, prevailed upon Sir Theodore Hope to abandon his obstructive policy, and allow the new system a fair trial.

The Committee's request for an extension of shed accommodation at Howrah was not however, acceded to on the ground that in four years' time the docks would be completed, and we are therefore asked to consider the yearly recurring block at Howrah as an incurable evil. I trust the Committee in the coming year will again strike at the ridiculous policy of Government in this matter, which we may liken to a parsimonious mother endeavouring to repress a growing boy within the garment of his childhood on the plea that in a few years time he would require the clothing of a man.

At the present moment the sheds at Howrah are so blocked that it is impossible to make a proper inspection of the several consignments, and in consequence an abnormal amount of swindling and false packing is going on. For the past month it has been quite impossible to draw samples from the middle of a pile, as there is no passage left between the different consignments, and this state of things is likely to continue until the end of July. It is impossible to convey in words the serious injury done to the trade by this state of things, and as it is equally impossible to approach Government at this season of the year in any other way than by letter, it follows that we are never able to put our case before Government as strongly as it deserves; but if we could induce the Public Works Department to send an officer to spend the remainder of this month at the Howrah godowns, and to make a careful report on the condition of things there, I do not think we should again meet with a refusal of our request for more accommodation.

(2) On the subject of the injury done to trade by the encouragement given to petty traders, I feel it necessary to say a few words. Some years ago deliveries were made in lots of 100 or 200 tons. Only one sample had to be drawn, one weighment and one refraction made, and *two payments* closed the transaction. This was owing to the special class rates being given only to consignments of full train. But Government interfered and insisted on special class rates being extended to all consignments of one waggon load, with the result that it is possible to have two lots which require sampling, weighing, refracting, &c., under a contract for 100 tons. Thus while the accommodation remains stationary the amount of work to be done is immensely increased. Nor is this the only evil connected with the extension of special class rates to waggon consignments. The whole position of the trade has been lowered by the introduction of a class of petty and practically irresponsible traders who can conduct an almost unlimited business on a very limited capital. These men are of necessity,

only "fine-weather sailors" and implement their contracts only when the markets are favourable; when the tide of adversity sets in, they simply ignore existing contracts, take a new name and start a new business, well knowing that their previous buyers can only resort to the small cause court for redress, and that before a case against them could be heard, they would probably have undergone half-a-dozen changes, and would be able to evade justice altogether. There is no doubt that we must take steps to remedy this state of things. Unfortunately, as Government is at the bottom of the change it will probably take us years to convince our rulers that they are blind alike to their own and our interests, in thus fostering the growth of all that is objectionable in the trade.

(3). The subject of the 5 per cent standard of refraction in wheat has had a considerable amount of attention from the Committee. The position we have taken up is that it is not possible to reduce the standard of refraction below 5 per cent in the present condition of the trade. This standard of refraction was fixed to supersede the old custom of buying *hoomka*, and experience has shown that it is impossible to reduce this standard unless the whole method of conducting the trade is to be altered. The question is not whether our existing standard is 2 per cent or 3 per cent too high; it is—whether the wheat is to be sent to the Coast Ports in what we may call its normal condition of cleanliness, or whether the whole of the wheat exported is to be cleaned to purity before shipment. Now, while every one must admit that it is undesirable to pay freight and railway carriage on 5 or 6 per cent. of foreign admixture, it is left for those who are practically interested in the trade to say whether it would pay to remove this foreign matter and ship pure wheat. Government has taken up this question of refraction, and represents the theoretical side, while we have been left to take the practical and always unpopular view, and say, "*It won't pay.*" There can be no doubt but that if the establishment of cleaning depôts were to be attempted, the money would have to be found by Government, and the work would be carried on under Government officers. The initial cost we may put down as about a million sterling, and the cost of management would, no doubt, be on the usual scale of Government magnificence. The Director of Agriculture, Bengal, in his report to Government on this matter of refraction, cynically remarks that instead of impressing upon the cultivators the advantage of keeping their wheat clean, as recommended by the Chamber, he would be doing them better service by recommending them to adulterate their wheat to at least 5 per cent. This remark shows the utter ignorance of the writer of the present condition of the trade. I am speaking with some knowledge of the subject, when I say that, practically, no wheat is delivered under 5 per cent, while the average, with the exception of what is delivered in the first month of the season, is about 6½ to 7 per cent. Of this refraction about half is dirt, straw, chaff, &c, the remainder peas, beans, barley, oil-seeds, &c., and shrivelled and dried grains. This shows that there is no room for the Director of Agriculture's advice to adulterate to 5 per cent; if he would direct his attention to carry out the Committee of the Chamber's recommendation to advise cultivators to cease growing mixed crops, &c., it might have some effect in keeping the refraction at the limit fixed by the trade.

I cannot leave this subject, though I have detained you so long, without referring to the report recently published by Mr. Smeaton, the Director of Agriculture of the North-Western Provinces. I have not the time to enter into a detailed criticism, nor is it necessary, as some able correspondents have already done so in the newspapers; but I cannot pass over this opportunity of publicly protesting against the unjustifiable statements made in the first part of that report. Mr. Smeaton seems to have relied for his information on a Mr. Wishart, who, so far as I have been able to ascertain, has no connection with the wheat trade, and indeed from the internal evidence of his own letter, it is apparent that he has only a superficial knowledge of the business, or he would not speak of shippers "making their profit on refraction"—nor of wheat "passing in London and Liverpool as below 5 per cent refraction," and other similar statements. This gentleman, in his letter states: "In the N.-W. P. and Oudh, the Calcutta shipper is supposed to instruct his staff to get some allowance from the up-country dealers in both weight and refraction." On page 4 of his report Mr. Smeaton writes: "It is a regrettable fact that as stated by Mr. Wishart and confirmed by undoubted testimony, agents of the Calcutta shippers *do* in their negociation with country dealers often strive successfully to obtain unfair allowances both in weight and refraction." It seems to me that before a statement of this sort was published, it was the duty of Mr. Smeaton to be perfectly sure of the ground he stood upon, and to have exercised the common prudence of hearing both sides of the question and of taking effective measures to ascertain the accuracy of such a statement. I have no hesitation in challenging Mr. Smeaton to produce what he is pleased to call undoubted testimony; and further, if such a statement be persisted in without the production of such testimony, it deserves to be branded with that most uncompromising word in the English language which has been so freely bandied about lately in the House of Commons. It seems to me a disgrace that a man occupying so important a position under Government, should be allowed under the shelter of that position, to vilify with impunity, the whole of the wheat exporters of this port; or that the Director of Agriculture should bring a charge in his official capacity against the whole shipping community which, if he made as a private individual, against an individual firm, would probably bring him before the Court as defendant in an action for libel.

In conclusion, I would ask you to cast over in your minds the names of firms who have within the past seven or eight years attempted this seed and wheat export business, and then reckon up how many now remain. I find that eight firms have tried, and retired from this business. Of this, one has been wound up; the remainder have simply retried from a business they were not able to make pay its way. Does this point to a business which, according to a Government note on the wheat trade some two years ago, showed a margin of profit to the exporter of 3s. per quarter, or even according to the same authority last year, a margin of 1s. 6d, per quarter, or, as Mr. Smeaton in his note on the trade states, of 10d. = 2¼ per cent; or does it show that the operations of those firms have not been successful? I have no hesitation in saying that the want of success is largely due to the very unsatisfactory conditions under which we have to take delivery of goods at the Howrah Station, and the consequent difficulty of properly and efficiently examining consignments.

The Hon'ble Mr. R. Steel, rising, said that though he would not follow the president over the ground covered by his interesting address, he proposed to make one or two remarks before them. While the Chamber sympathised with the difficulties under which the wheat trade was carried on, and was anxious to do all in its power to urge the Government, to develope the trade of the port, he thought the language used by Mr. Petrie, regarding the attitude of Government was in excess of the case, and in his opinion was not justifiable. He was not disposed to sympathise with those expressions and the Chamber would doubtless agree with him, that the words were Mr. Petrie's, and that they did not share, in the sentiments expressed by that gentleman. Mr. Petrie charges the Government with being obstructive. From his own experience he found it to be the contrary; the Government were ever desirous of contributing towards the development of trade, consistent with the interests of the public generally. Regarding the construction of a permanent bridge across the Hooghly, as suggested by the President, Mr. Steel did not consider the present a favourable time for undertaking this work. For fifteen years the existing bridge had cost the public and trade of Calcutta something like 30 lakhs, and the erection of a permanent bridge would entail a continuance of this burden. The speaker entirely agreed with the President's remarks on the charges for administration of justice. This method of raising money was condemned by every political economist. The surplus revenue of the law courts amounted to 30 lakhs annually, and this he considered should be remitted, even at the cost of alternate taxation. Touching the export duty on rice, a subject of special interest to the speaker, he condemned the imposition of a tax on raw produce, the only plausible excuse for which was the statement that as Indian rice did not come into competition with the rice of other countries, the tax on it was a fair and proper source of revenue. This was a mistake. It had been stated that a tax on the export of rice had a tendency to retain in the country the food of the people; but in Bengal, for instance, with its varying crops, it was obvious that if sufficient rice was to be grown every year a surplus should be aimed at. The best way to obtain a surplus was to create a demand, and in the time of scarcity the prices obtaining would retain the food India required in the country. The Chamber would do well to suggest to the Government a change in the present Budget arrangements. The public were never consulted when a tax was to be taken off, but only when it was proposed to levy one; but in his opinion whether the proposal was to increase or decrease taxation, it should be equally submitted to the ordeal of public opinion.

Miscellaneous Items.

A Mr. Robert Thompson, described as an "Eminent authority on paper fibres, or fibrous plants for paper pulps," writing from Jamaica, to the *Paper-Makers' Monthly*, goes into the details of the proper method of gathering and shipping bamboo for the purpose of manufacturing paper, and states that he is in correspondence with a large exporter of American paper, who is much interested in the importation of this fibre into America.

The spurious butter manufacturing business is exciting almost as much attention in England as in the United States, for we note that the Butterine and Oleomargarine Bills now before Paliament have been referred to Select Committee, in order to give the retail sellers of butterine, who form an important body of tradesmen in the cotton districts, an opportunity for giving evidence against the placing of any restriction on their business. Some idea of the importance of the butterine trade may be gathered from the fact that the total quantity of that substance imported into the United Kingdom last year, was valued at more than 3,000,000*l*. The imports for the first three months of the present year represent a value of over 1,000,000*l*."

An English exchange, writing of the extraordinary variety of asparagus recently found growing wild on the steppes of the Akhal Tekiz, says:—"A new and extraordinarily fine variety of asparagus has just been discovered, and that, too, in one of the very last places in which one would think of looking for anything rich or rare in the way of vegetable productions. It seems that the steppes of Akhal-Tekiz, recently annexed by Russia, are covered in parts with asparagus, which, though growing perfectly wild, attains a size unknown in the market gardens of Europe. The stalks are said to be nearly as thick as a man's arm, and they grow to the height of five and six feet. A single one of them is quite enough, we are told, to supply ten Russian soldiers with an excellent vegetarian meal. Wonderful! The flavour of this asparagus is described as equal to that of the best European kinds. We should like to see a few of these plants at Covent Garden."

THE *American Agriculturist* says "The Cow Pea is one of the most valuable fodder plants for the South. We have seen a crop of peas which yielded four tons to the acre of most excellent fodder and it left the ground in the best condition for sowing wheat. Another farmer sowed peas among his corn at the last ploughing, covering them with the plough, and we should estimate the yield on the ground of both crops, at a ton, and a half of corn fodder and forty bushels of peas, with the corn equal to thirty five or forty bushels to the acre, and a large quantity of pea straw, which makes good feed. The common opinion that the South is not a stock country is entirely unfounded. With the long growing season, the really rich but badly managed soil, and the great variety of fodder crops and feeding stuffs, it is not at all exaggerating the matter to say, that beef cattle can be reared to one thousand pounds weight in three years, at a cost of one cent per pound live weight, and in addition there is a large quantity of manure left, which is really invaluable to the Southern farmer."

THE *Madras Mail* writes as follows on the subject of the Pondicherry ground-nut oil trade :—"The comparatively sudden development of the ground-nut traffic in Southern India has opened out markets for the oil which but a few years ago were not dreamt of, and Pondicherry has, from the early beginning of the oil trade, taken the lead in the Indian export markets. Last year's crushing operations were restricted, owing to the unusually high price of the nut, caused by a heavy export demand throughout the whole season' and also by a decreased supply arising from inundation damages to the crops. In 1884, the total crop was estimated at upwards of 80 000 tons. Nearly 70,000 tons were exported in bulk and in oil, from Pondicherry alone, and this year's yield is expected to exceed 100 000 tons, about nine-tenths of which will probably find its way to Pondicherry. Just now, however, there is a depression in the trade in consequence of the exceptionally low quotations at Marseilles ; still there are buyers at growers' prices—mostly as yet for crushing and for shipment in shell to coast ports, Calcutta, Burmah, and the Straits. It is calculated that at Rs. 10 per candy, at the place of growth, cultivators can realise a fair profit so that at the present rate Rs. 16-12 0 per candy, either the producer or 'middle men,' or both, must be making extravagant profits. Last year the price touched Rs 22, and kept at above Rs. 20 for the greater part of the season. The rapid development of the ground-nut industry is traceable in a great measure to the comparatively easy method of cultivation. Beyond the sowing and gathering of the crop there is nothing to be done, it requires no watering and needs no tending, as the coolies who collect the nuts are paid in kind, the capital outlay is limited to the mere cost of labour for scattering the seed. Within the last year or two, and notably from the beginning of the present year, nearly all the eastern coast ports and Calcutta, Rangoon, Moulmein and the Straits have been regular buyers of the Pondicherry oil ; even at the current high rate of the nut it can be manufactured and sold at about one rupee per impertial gallon. The ground-nut oil trade is as yet but in its infancy, and the cheapness and purity of the article together with its unquestioned general usefulness as a *Cuisine* commodity must cause a steadily increasing demand for it."

A CORRESPONDENT writes as follows, on the subject of pearls in cocoanuts, to our Ceylon contemporary :—"I am somewhat surprised that the fact has escaped you that this subject was fully discussed in the Ceylon *Observer* some years ago, with extracts given, if I recollect aright, from the Straits or Java papers. If such a fact as the occasional occurrence of pearls in cocoanuts existed in Rumphius' time it was sure to be recorded by this most excellent and industrious writer, and the statement made by your correspondent that Rumphius alludes to this fact is likely to be correct. You will find Rumphius *Harbonium Amboinense* in 6 folio volume in the foreign list of books, in a shelf in the north end of the Colombo Library, and a glance at the index at the last volume, and another at the description of the cocoanut given in double columns, one in Dutch and the other in Latin, will very soon enable you to see if Rumphius has alluded to pearls in the cocoanut. If this be a fact the hackneyed expression 'and this accounts for the milk in the cocoanut' may be changed into 'the pearls the coconut.' And why not Pearls in the Cocoanut?" Upon this the Editor of the *Tropical Agricu,turist* says :—"We hope to refer to Rumphius in due time and if, as we suppose, from the statement made not by "our correspondent," but in a quotation from a Java newspaper, the accomplished Dutchman did refer to concretions in cocoanuts, we feel quite certain that instead of asking "Why not pearls in cocoanuts?" He noticed the phenomenon as exceedingly rare and very curious. And for this reason,—that, unlike the pearl-bearing shells, which are formed of carbonate of lime and have the power of secreting that mineral to any extent, the cocoanut has the slightest possible amount of line in its composition, "The milk in the cocoanout" is first highly saccharine, and then as it coagulates highly oleaginous, and true pearls can be formed neither from sugar nor oil. We are quite prepared to learn that the concretions on analysis differ entirely in composition from the nacre of which pearls are built up. We have no recollection of this subject of pearls in cocoanuts having been discussed in our paper, but a very vivid remembrance of our having quoted, only to cover with deserved ridicule, a paper in the transactions of the Straits' Asiatic Society, by a Mr. Dennys, in which people in this nineteenth century were asked to swallow the outrageously unscientific statement that grains of rice shut up in a box developed into life, and then becam e pearls which increased in size with efflaxion of time! That we believe, was substantially the story, which even the most pronounced evolutionist could not swallow. The question we should now like to ask of men like Mr. W. H. Wright, Mr. W. B. Lamont, Mr. Jardine, Mr. Pischaud and other cocoanut planters, is, "Have you, in all your Ceylon experience, seen or heard of so-called pearls in cocoanut ; *We* have not?"

Selections.

ENSILAGE—THE FODDER OF THE FUTURE.

IT will perhaps surprise many people who have not had either the opportunity of reading books on ensilage, or the inclination to read them when at hand, to learn that ensilage which is slowly and with much difficulty being brought within the sphere of practical husbandry, was known and used as a fodder as many as forty-five years ago. It was made in Germany and Hungary with apparent success as long ago as 1842. The idea was then taken up by farmers in France and America, and finally England—ever the last to take up a new discovery or invention—gave some attention to this subject. It was formerly known by the appropriate title of "sour fodder" or "sour hay," and "term Ensilage" has but lately been invented for it. America, with the dash and energy we are accustomed to associate with her, set to work vigorously to experiment on this new method of preserving grass, &c, and if we can rely on the reports periodically published of results, her efforts have been successful in bringing this new means of feeding cattle to a more forward stage, and in proving its practical importance. In England some isolated attempts were made by a few intelligent and progressive farmers as far back as 1876, but no serious attention was generally given to the matter till as recent a date as 1882-83. The many books, pamphlets, papers, &c. lately writen testify to the importance which is now attached to this fodder ; and as experimentalists and analysts come forward and make known their successes and failures, with these deductions therefrom, and explain the chemistry of the processes by which grass, &c., becomes sour and sweet, ensilage, or more decayed matter, we may confidently look to still further development of the practical utility of siloed fodders. Grain and other items of food are still stored by barbarous or semi-civilised peoples, in holes and pits securely fastened up, and this practice may be traced back to almost pre-historic times. All travellers mention this custom, and allusions to it are not infrequent in the ancient classics ; and yet to silo grass, which is but another step in the same direction, seems not yet to be accep'ed as a real and rational mode of preserving an article so essential to the owners of cattle

Ensilage is a fodder especially adapted—nay, almost necessary—to this country, where grass is superabundant for periods varying from two months in sparingly watered districts, to three months in parts more favoured by cloud compelling Jove, and where for the rest of the year it becomes scarcer and scarcer till hardly procurable, even in small quantities, during the hot-weather months. But it is proverbial how wedded India is to old ideas, and with what difficulty a new one is adopted and brought into use. This being so, it behoves Government through one or other of its many departments to take this matter in hand, and to show both the simplicity and efficacy of the process, with its inexpensiveness and the saving to India's wealth which would result from its general adoption.

Beyond some experiments—some half-a-dozen—made in Calcutta by Brigadier-General Wilkinson, and some further attempts made at various places with various results by those either uninterested or without the information needful to give a starting point for their intelligences to work from ; beyond these, nothing has been attempted in India to add to our knowledge of the process by which grass becomes ensilage. Government grass farms and the experimental farm at Cawnpore make ensilage of varying quality, because, otherwise, a deal of the grass grown during the rains would be wasted, and to procure the requisite amount of fodder a far larger area of grass land would be required, were grass not so preserved ; but no sustained and intelligent attempt has been made by carefully noting all particulars such as the shape of the pit, description of grass, the state of the grass when cut, the state of the atmosphere when the grass was pitted, the amount of pressure employed, &c., &c., with the result in ensilage to deduce any practical instructions for beginners in this mode of preservation.

In this country we are told that numberless animals die yearly from the effects of starvation in the hot months, and over-feeding at the commencement of the rains on the immature and watery grasses which spring up as it were by magic after the first few showers. This wholesale destruction of valuable stock could be prevented by utilising ensilage and it is much to be regretted that Government, at least the Local Governments, do not move in the matter. Even in the present somewhat theoretical stage of our knowledge, very good fattening wholesome stuff can be made in a rough way with very little expense ; and if Deputy Commissioners, Collectors and others in charge of Districts exerted their influence over some of the more prominent zemindars to give the fodder a trial, it is more than probable that in a short time small farmers would attempt it, and the fodder would become in the future a very valuable addition to our resources in the cattle feeding line, far cheaper and more nourishing than dried grass—the native "hay" —and sapless stalks, termed "bhoosa."

There are two kinds of ensilage, distinct in taste and smell : (1) sour ensilage and (2) sweet ensilage. Of these the sour is the easiest to make, requiring much less trouble and attention, while it is as much liked by the cattle, and nearly as nourishing as the sweet kind ; but it has, in many instances, a very strong tan like smell which is objectionable at first to men, but to which those having much to do with it soon get accustomed.

The chemistry of the two is, as might have been expected, somewhat different, the sour or sweet taste and smell of the stuff being due to more or less fermentation having occurred in the pit : in fact, sweet ensilage has undergone very little, if any, fermentation. Analysis of samples of ensilage show that many kinds of ferments appear in the silo, the chief being alcoholic, acetic, lactic and

butyric; and they generally occur in the order here set down. It is when the fermentation has proceeded to the butyric stage that the ensilage acquires that strong disagreeable smell. These ferments are present with the grass when it is put into the pit, and settle on the dead cells of the blades of grass—become dead, that is, by being cut and exposed, however short a time, to the air. The free oxygen necessary for starting them into activity is plentiful during the filling of the pit, but once active, these bacteria remain existent without free oxygen. In the meantime the living cells require nourishment, and exercise their usual functions; and the more actively these functions are performed, the sooner the stock of nourishment in the pit becomes exhausted, and the quicker the cells become dead and a prey to ferments. During this process the constituents of the cells change:-starch becomes sugar, and sugar in its turn alcohol. At this state the less desirable ferments become active, such as acetic, lactic and buytric.

These bacteria cannot exist in great cold or heat, and this gives us a clue to work on in filling our pits. At from 50° C to 60° C, it is believed, these bacteria die away. The pits are therefore filled slowly, a temperature of over 50° C being obtained before, day by day, fresh grass is thrown in. By this process the heat of the pit is maintained at a degree inimical to the existence of the ferments, and the ensilage when taken out will be found sweet. But the care and attention required to procure this is such as would be impossible in filling several pits. This leads us to a point of importance. The preservation of grass &c., in siloe depends on the cells of the article thrown in being living, as then alone can they resist the action of ferments. Only that grass, then, should be ensiled which has reached its strongest stage of growth, the cells being then more robust. This stage is reached shortly after flowering; and at this period, too, there will be less water in the plant. It is self-evident that if we desire the temperature of the pit to be great, the less proportion of water there is contained in the fodder siloed, the easier will it be to obtain the necessary heat. Hence immature grasses, &c., will not make good ensilage, and should not be siloed.

In England several analyses of the two kinds of ensilage have been made, and it is almost invariably found that the sweet-smelling kind is richer in nutriment, though both contain great nourishing properties It must not, however, be concluded from this that because the sweet kind, which is supposed to have undergone little fermentation, is most nutritious, all fermentation is bad. It is, on the other hand, beneficial. It dissolves a good portion of the woody, indigestible fibre of the fodder, and a certain amount of lactic acid appears from experiment to be good, aiding the digestive organs of the animal fed. But the difficulty is—and for this no remedy has as yet been found—to regulate the extent of the fermentation when once commenced, and prevent it proceeding by successive stages to butyric and putrefactic. Hence Monsieur A. Goffart, the great French authority on ensilage, prefers that no fermentation should occur in the pit. When ensiled grass is taken from the silo, the exposure to the air starts fermentation, and this is good, making the stuff more palatable and being more readily regulated, as the degree of fermentation will depend on the period of its exposure before being eaten.

Another supposed remedy for fermentation in the pit is excessively heavy weighting. The cells first absorb all the oxygen in the pit, evolving carbonic acid gas which acts as a preservative; but the quantity of oxygen absorbed, and therefore of carbonic acid gas evolved, decreases week by week. It is evident the greater the pressure the less danger to the pit is there from the atmosphere, and therefore the less carbonic acid gas required to assist in repelling the introduction of air, and the less amount of work in absorbing and evolving required from the cells for their own preservation. The result is a more sluggish existence of the cells, which means a prolonged period before exhaustion, when they become the prey of ferments. In this method of making ensilage the temperature of the pit is generally very low, and for this, too, slow filling is recommended by its advocates, the reason assigned being that the cool, fresh grass reduces the temperature of the mass of fodder already in the pit, and that, time being allowed by slow filling, for subsidence, more fodder is preserved in the same pit, and that this by its own pressure, gives a certain amount or extra weighting. Both these systems aim at the same effect, *viz.*, to prevent fermentation in the pit: the first, by killing the bacteria; the second by keeping them in an inactive state. The deduction to be arrived at then, is that slow filling should always be resorted to; and that, in this country heavy weighting should be practised, as watching the temperature in the pit would be impracticable with several pits to be filled at the same time. In England, France and America very large pucca-built siloes are used—often barns or other buildings are adapted—wooden siloes are also employed—and the grass has even been only stacked, but heavily weighted. The methods of weighting too, differ widely—from mere boards and stones to expensive mechanical arrangements. None of these are suitable for India. The expense of building would be great and nothing can be alleged against the primitive pit except that the loss in damaged stuff is greater owing to the grass along the sides, top and bottom getting somewhat mildewed. As there is greater friction against the rough sides of the pit the grass does not settle down easily and and heavier weighting is required than in a pucca silo but earth is always handy and affords a very satisfactory covering. The pits should be deep, rather than long or broad, the sides perpendicular and the corners rectangular. This allows a steady straight down pressure of the superincumbent weight. The earth taken out of the pit serves for the covering, with perhaps a little additional earth if the pit is not a deep one. Again, the site of the pit should be carefully selected,

and, as any irruption of water would be fatal, high ground should, where available, be chosen. A pit can be filled during rain without destroying the ensilage, though of course, the latter will not be so good. The grass or other fodder should be laid evenly throughout the pit, not thrown in in bundles, and left—as thereby a more even pressure on the whole mass is obtained: the grass at the sides of the pit should, too, be well trodden down by a man in the pit as the process of filling is being proceeded with.

As regards feeding properties, the deduction from the innumerable experiments made at home and abroad, is that animals fed on ensilage increase in weight keep in more healthy condition, have more equable temperature, and, in the case of cows, give increased milk, and richer, without there being apparent any flavour caused by the feeding. If milk or butter be left near any heap of ensilage it certainly acquires a flavour, but the enemies of ensilage have not been able to prove that feeding on ensilage taints the milk or flesh. Animals have been fattened for slaughter on ensilage and no taste in the flesh been detected. Experiments without number have proved this, and they cannot be put aside. It is a theory that it not the fattening elements in ensilage which produce these good results to cattle fed on it; but that, owing to the acids of the stuff, the cattle digest better and therefore obtain more good from their other food, grain, &c. A strong prejudice appears to exist in this country against the new fodder; but this prejudice is the outcome of ignorance, not the carefully thought-out opinion formed from a study of the literature of ensilage.

During the rains in India two and even three good crops of grass can be obtained, but it is impossible to make hay till about the end of September. What is to be done then? Leave the crop, running the risk of its "burning," till the season for hay-making has arrived, thereby losing one or two crops; or store the first crops as good nutritious ensilage till required in the ensuing hot weather, and make the last crop into hay? Surely, make it into ensilage, whereby from one piece of land a double supply of fodder is obtained. Yet one more advantage in favour of ensilage. It can be left for a very long period in its pit unopened without harming, and can therefore be stored longer then hay. With all these advantages and the simplicity of the means used to obtain them, it is surely strange that so little attention has been paid in this country alone to the matter.

In conclusion, then, the advantages claimed for ensilage are:—

(1) It is an additional means of storing fodder, so abundant at one period and so scarce at another.

(2.) It enables a far larger quantity of grass to be obtained from the grass land.

(3.) Its nutritious properties are superior to dried grass or roots, which often have to do duty for grass or bhoosa.

(4) The means employed to store it are simple in the extreme;—

(5) And inexpensive—the pit costing from Rs. 5 to Rs. 10: and this outlay is initial only, the pit being ready for use year after year.

(6) Any crops such as kirby, &c., can be siloed, and thus kept green and nutritious instead of hard and dried up.

(7) Siloes can, if necessity require it, be filled during rain.

And what are the means to be employed to obtain these advantages?—

(1.) A pit situated secure from the irruption of water, deep and rectangular, costing from Rs. 5 to Rs. 10; (2), which should be slowly filled with whatever crop it is desired to preserve; and, (3). being filled up as tightly as possible, should be covered over with the earth taken out of the pit, and this covering made as heavy as possible by the addition of extra earth, if thought needful.

Allow that the advantages have been exaggerated, and the difficulties lessened, yet still a deal remains on the side of ensilage; and, considering the importance of the subject, *viz.* an addition to our means of making the most of our annual crop of grass, and to our few fodders' it would be well worth paying some serious attention to, were the advantages and disadvantages equally balanced: how much more so, when the scale remains well-down on the side of ensilage—*Pioneer.*

THE PITA PLANT.

The pita plant of Honduras invites the enterprise of American capital and Yankee invention. Only one thing is needed and the lucky man's fortune is made. Mr. Burchard, our counsel, reports that this pita plant which has never been cultivated grows spontaneously, and in apparently inexhaustible quantities by the margin of every river and lagoon, and indeed anywhere below the altitude of two thousand feet It can be had for the cost of cutting. The fibre is susceptible of a thousand uses. The people of Honduras convert it into thread for sewing boots and shoes, and into nets, fish lines and cordage The finest hammocks, and most costly are also made of it. The small quantities which have been sent to this market have been manufactured into handkerchiefs, laces, ribbons, false hair and wigs. The difficulty is to corticate the plant without rotting or otherwise injuring the fibre. The man who can do that will be able to take fortune at the flood.—*New York Herald.*

It is very strange one might almost say mysterious, how certain things or places seem to recur in history with the most sober and matter-of-fact pertinacity; how they thrust themselves under our very noses, as it were when we have done everything that a well conducted race of white people could be expected to do. Just think of it a minute here was old man Columbus lotking around for a place to plant flags—that what Ponce de Leon did, later, when he took the Fleur de Lis to Florida—and not satisfied with the size of the foothold he had secured in the Bahamas, his real appearance on the American stage was ten years later, when, in 1502 he first landed in Honduras. That's where he really first found America, for the Bahamas are no more America than Jersey City is Philadelphia, although a diligent following of the nose, in a westerly course, would bring one to port in either case.

And here's where the curious part comes in. Mr. Columbus was aiming to get into the spice business on the ground floor, and incidentally raked in a few gold mines as he sailed, and thereby replenish the depleted exchequer of the glorious monarch he had left at home filling up on prime old Madeira, and solemnly contemplating the ventilators in the north-east angle of his silken hose.

Now Columbus found a fair and remunerative amount of gold and gems in the hands of the natives, which he religiously toted back to the old country, and, thereby exciting the cupidity of the ring that ran the army and naval appropriations, became incidentally responsible for letting loose that hoarde of blood-thirsty cut-throats who sailed on his track and "Christianised" the innocent Indians to their destruction and the curse of the country.

The cupidity of these lusty and lustful scoundrels so alarmed the simple Indians, that they refused to divulge the hiding places of nature's treasures, and the success of the intruders was but small in proportion to what might have been done with a little gentleness or scientific knowledge. The treasures were there, and are there to this day. Honduras is rich in minerals, not alone of the precious metals, but in iron, copper, zinc, antimony, and tin. The iron ore is said to be so pure that in many cases it is worked without smelting; but, as immense beds of coal are contiguous, smelting could be conducted cheaply and quickly.

The soil is productive and "lays well," as a farmer friend suggests, except that part to the "inwards" of the country, where much of it lays on edge—this is no disadvantage to the man that wants to chip off a winter's supply of coal, or pick out a few amethysts and other gems, as he goes along—but it is a little discouraging to the cattle which flourish so in Honduras. That is—with hides—probably the principal source of revenue. The government has lately shown a disposition to encourage the introduction of American machinery, and the men to back the machines, by giving some very valuable franchises—our old friend, Major Burke, of the New Orleans World's Exposition, having very lately received from Honduras a most extraordinary and favourable agreement of this kind, practically giving him and his company the earth—within certain prescribed limits—with the waters under and around and through it, and almost concedes the right to take in the natives also. Major Burke will no doubt see that this particular will not be neglected by his people. Another very important concession—a little older than Major Burke's—is one made to Mr. Burchard the American Consul at Ruatan, and Mr. Floyd B. Wilson of New York.

The importance of this subject to manufacturers of textile fabrics, and to paper mills, is sufficient to justify us in herewith presenting the major part of the report of one of our consuls in Honduras:

The pita plant is not cultivated or prepared for market anywhere in this consular district, nor is it cultivated anywhere in Honduras, except on the north coast in the district of Consul Burchard, and some, perhaps, near Ruatan, where he resides. As I have no authority to require him to furnish me the facts, I would suggest that the department could obtain a fuller and more satisfactory report from that consulate; and as a better one can thus be obtained, I will not delay this report for such information as can be gathered concerning it here.

The plant grows spontaneously in this country, but on rich lands in the bottoms, and rarely upon the hills or mountains. None grows in this department, or near here; and hence there cannot be procured the specimens that ought to, and necessarily would accompany any exhaustive report.

The plants can be grown successfully as close together as they can be cultivated. The usual height is four feet. The stalks will average eight leaves. The fibre is produced from the leaves, none from the stalk. The leaf and its fibre is from twenty-five to thirty inches in length. It grows throughout the year, but thrives best in the rainy season, which commences in June or July (owing to locality), and continues six months. Any who desires may gather it from the woodlands, the landowners charging nothing for the privilege. Only the most primitive and crude process of handling is known, and it requires a big day's work for one person to cleanse as much as twenty pounds. The necessary labour can be had for fifty cents per day for each labourer. The raw material has no market value here. A few gather it for manufacturing by their own hands into such articles for sale, as ropes, sacks, hammocks, and "arganillas," or a kind of saddlebag. Its tensile strength gives it great value as a sewing thread, formerly much prized by saddlers, and shoe and boat-makers; but now its use is almost entirely abandoned for this purpose, since the introduction into the country of the cheaper thread from the manufactories abroad.

With its tensible quality and tensile strength, it has also, according to some informants, a resinous substance, that imparts to it a strong resistance against rotting from exposure to water or moisture; and this would peculiarly adapt it for fishing lines, nets, cables, tent cords, sail-ropes, and such like articles. It is believed that under proper cultivation and treatment it may be applied or used as material for handkerchiefs, and cravats, &c., and such upholstery as towels, table-cloths, napkins, curtains, and tidies. There is little known here as to what degree of fineness the fibre is susceptible of improvement. It is said, however, that a Mr. Henry Weckler, of Philadelphia, procured some of it, out of which he had manufactured a few handkerchiefs of snowy whiteness and excellent quality.

Its principal growth is in the department of Santa Barbara, El Paraiso, Copan, Yoro, and Colon. It never grows spontaneously in large quantities in any one place in Honduras.

In the years 1882 and 1883 there were grown 21,887 plants of pita in the department of Santa Barbara. The product of these was valued at one thousand seven hundred and eighty-seven dollars.

Except this little solitary item of so long ago, there is absolutely no data to show either the amount produced or the amount consumed for domestic uses, and so far as the records show, none was ever exported from this country.

Notwithstanding the efforts of this Government to introduce its culture, as shown by enclosures herewith, it has never been an article here of any commercial value, and but little attention is paid to it. This is so, first, because the population is so sparse as not to require the same diversity of pursuits as in other countries where it grows; second, because of the want of transportation facilities, there being no navigated streams in the country, and no roads of any kind but only mountain trails and mule paths, or bridleways; third, there are no machines for preparing it for easy transportation, or no decorticating machinery to extract the fibre; fourth, there is no factory in the whole country to convert it into articles of use.

As these obstacles are not likely to be removed in the near future, it is now useless to conjecture whether the pita will soon, or ever furnish a profitable industry in Honduras.

D. W. HERRING,
Consul.

UNITED STATES CONSULATE,
Tegucigalpa, September 22, 1886.

The name pita plant, is a misnomer, in so far as the plant goes, though if the production of the fibre should become active; enough so to justify the investment of capital in shipping and handling it, more than likely the name pita would stick as tight as it is said the juice of the plant will.

By the way this juice of the plant is nothing more nor less than the *pulque*, which the Mexican bandits fill their hides with just before they start out to capture Texas, and the balance of Yankeeland.

The pita fibre is extracted from the leaves, branches and stems of *Agave Americana*, or American aloe as it is often called—the century plant of our conservatories—(no Joe not conservatives)—and is known in Mexico and even in some parts of Central America, as the *maguey* plant.

The *pulque* or octli, or *agave* wine, as it is variously called, is in many places called *mezcal*, but the real up and up Dons, who sling on all the style their Spanish cloaks will hold, say, *aguardiente de maguey*, but under any of these names it "gets there" with a celerity and a fiery certainty that is somewhat astonishing on a short acquaintance.

This pita fibre is also made in small quantities by the paeons of Mexico, and is then called *maguey pita*, or *pita hemp*.

The *Pita agave*—let's call it that, for a starter—belongs to what the jaw-breaking botanists call *amaryllidaceæ*, but in fixing your mind on the probable benefits to the country of the extensive cultivation of this seductive, new friend, you want to forget this latter name, or furnish all your friends with Latin lexicons, otherwise they might enter into sudden declensions of the verb to be, and conclude it was not to be. There is a beautiful and touching description of the plant in our botany, elegantly and picturesquely embellished with Latin names—latin-to the text with charming abandon; but we forbear, we will not attempt to produce it here (our italic case is getting low now), but before we leave the subject we want to urge you to read upon pita—no relation to Pepita—and when you come to the illustration of the plant and recognise the likeness to the old tin candelebra that they had in the country meetin'g-house when you was a boy, remember it was the sober, baldheaded editor of the *Gazette* that first held the lamp to your path.—*Southern Trade Gazette.*

DEVELOPMENT OF THE INDIAN TEA INDUSTRY.

THAT the more hopeful views which have of late been gaining ground here regarding the future of our local Tea industry, are not altogether unfounded is, we think, abundantly shewn by the rapidly increasing hold which, to judge from recent deliveries, Indian and Ceylon Teas appear to be taking of the home market. As was to be excepted, the low prices prevalent last season have had the effect of causing the consumption to advance by "leaps and bounds," and while this has naturally resulted in a gradual hardening of London values, until they have now reached a level much above the prices ruling in the Calcutta market during the greater part of last season, it is satisfactory to find that this advance has had no apparent effect in checking the heavy deliveries of recent months, and to all appearance an average off take in the future of seven-and-a-half million lbs per month, at the least, may safely be counted upon. Indeed, the deliveries from the commencement of the year rather exceed this average, the total being over 38 million lbs. for the five months, and this represents an increase of not less than eight-and-a-half million lbs, as compared with the corresponding period in 1886.

All the indications, too, point to a still further increase in the demand from the United Kingdom, and London brokers estimate their present season's requirements of Indian and Ceylon descriptions at close upon 100 million lbs. So there is little likelihood of the available supplies proving in excess of the demand; and it is a significant fact that the tea-brokers are almost unanimous in warning China buyers to exercise the utmost caution in operating, owing to the increased preference manifested at home for teas of Indian growth. That this warning is fully justified is shown by the falling off in last month's deliveries of China sorts, the decrease, as compared with the corresponding month of the previous year, being 1,000,000 lbs.; and if evidence were required of the growing popularity of Indians, it is supplied by a reference to the advertising columns of any of the local weeklies published in the provinces, which show that every other little village can now boast of an enterprising shop-keeper offering pure Indian teas for sale, and who finds it to his interest to noise abroad the superlative merits of this country's manufacture, as compared with that of China. In Australia

where the consumption per head of the population is stated to be larger than in any other country, there is a market full of promise and a few years will serve to bring the colonies largely into this market as buyers, for the taste has already taken firm root in the Colonies, and is rapidly spreading. Were Indian planters more ready to meet the wants of Australia by packing teas in smaller boxes—10 and 20 lbs., for example—there is little doubt they would thus place themselves in a much more favourable position to contest the ground with China than at present. The colonists have become accustomed to small-sized boxes, which are really a great convenience where teas are largely purchased in original packages to be sent upcountry, and the full-sized Indian chest, apart from the greater difficulty in handling them, contain a larger quantity than many squatters care to buy at a time.

The meeting for the purpose of promoting the consumption of the article among the Natives of India, the proceedings of which were reported in our issue of Friday, is an effort in the right direction, for there is no doubt the natives are not only very partial to the fragrant beverage, but have great faith in its virtue as a specific for fever and other ailments. The enormous extent to which such trade might ultimately develop is at once apparent when we consider that a consumption per head of only 1 oz in a year would require a supply of 15 million lbs. of tea. Upper Burmah at present obtains considerable supplies overland from China, and it should hardly be a difficult matter for Indian enterprise speedily to oust China from that market. A writer in a recent issue of the Economist called attention to the large profits derived from our tea industry; and he was justified in doing so; for to investors at home, where at present large quantities of capital are fetching little or no return, owing to the merely nominal rates of interest ruling there, many of our sound tea concerns, yielding eight, ten, and higher rates per cent. on their current values, must appear attractive investments. That English investors are turning their eyes in the direction, is proved by the fact that it was currently stated in London commercial circles, when the last mail left, that the Messrs. Rothschild had invested £10,000 in the shares of one of the large Assam companies.—*Englishman.*

BURMESE EARTH-OIL.

A CORRESPONDENT of the *Times*, writing from Rangoon, under date April 7th, gives a long account of the possibilities of a Burmese petroleum industry:—

THE TWO BURMESE OIL-FIELDS.

There are two distinct oil-fields in Burmah: one on the Arakan coast, in the neighbourhood of Akyab, and the other in Upper Burmah at a place called Yenangyoung. But there are many other places where petroleum oozes out of the soil and where it may exist in quantity. Wells have been made at Thayetmyo, the old frontier town. At Mimbu petroleum is noticed in small quantities in the neighbourhood of the mud volcanoes. Also it has been stated by those who went on the recent expedition to the Yaw country to the west of the Chindwin, that petroleum was observed. But the mere fact of signs of the oil being given on the surface of the earth by no means points to any considerable quantity below. In America, as at Baku, the most productive wells have not been those sunk where there were external signs of oil. Until a boring has been made the capacity of the region underground cannot possibly be known. Signs of oil are very widely distributed in nature, but the productive fields are few. In fact it has been the American fields that have supplied the world with oil, while all the others have only provided enough for local use. Until the admirable system of producing, refining, and distributing the Baku petroleum was introduced by M. Nobel, not even the Russian product had the slightest effect on the European market. And as no speculator has then permitted to work the Yenangyoung oil field, its productiveness yet remains unknown. When writing of Baku, three years ago, I pointed out the great change that had been wrought by the substitution of the American methods of working the wells for those that obtained previously. In Burmah the improved methods have only been tried in the Arakan field, in British territory; that at Yenangyoung is still worked in the old way. And a very few words only are necessary to indicate how great is the difference between the two methods in their operation and results.

PAST AND PRESENT PRODUCTION.

At the outset of this inquiry we must distinguish between the amount of oil actually produced, and what the wells are capable of producing if properly and efficiently worked. The American oil has long been selling so very cheaply that no competition has been possible; and, of course, when it does not pay to raise and refine the oil, the industry will not be prosecuted. Machinery is dear in Burmah, and so is skilled labour, and thus there has been little to entice speculators along an utterly unknown path. In Akyab during several years past, the wells have been worked, and the oil refined, but the result has been disheartening. The companies formed have either been unsuccessful, or have merely kept going without making any profit on their labours. At the commencement of the operations about ten years ago, as much as 250 gallons a day was got from one well. Thus encouraged, the work was prosecuted on a larger scale. Four years ago there were 24 wells, ranging from 500ft. to 1,200ft. in depth, from one of which, for a time, 1,000 gallons a day were pumped. The company that was then working raised 234 300 gallons in a year, and refined 86,450 gallons, selling the rest in a crude state. As the price of refined oil was very low, there was a loss on the operations, and the works, as above said, have almost, if not entirely, been stopped. There can be little doubt that a considerable amount of oil is to be found in the region; but so long as prices are low, and the production costly, little progress can be expected in the Arakan oil industry. The Yenangyoung oil-field, being situated in Upper Burmah, suffered from the mis-rule existing during the independence of that country. King Mendoon Min, the predecessor and reputed father of the ex-King Theebaw, made the production of earth-oil a royal monopoly, and the production suffered accordingly. There was no scope for the employment of Western methods, and no guarantee for the security of Western capital. Nor would the labours of Englishmen have pleased the King, who is asserted to have removed his capital six miles to a new site that he might not be troubled with hearing the noise of the English steamers. There were 200 royal wells at Yenangyoung, and about as many in private hands. Many of these are not working. At present about 200 are working They produce about 30 tons per day, or about 7,500 gallons, This would give an average of 37, gallons. This per day, per well. In the 200 referred to are included about 60, situated at Bama, in the neighbourhood of Yenangyoung. Beside those already named there are two or three wells at Thayetmyo; opposite Pagan there is another, and in the Yaw country there are two or three shallow wells, as noticed above. The large proportion of the oil is sent down in barrels, or in bulk in native boats to Rangoon. There is one refinery here, which has therefore a monopoly of the whole oil produced in Burmah. The natives in the neighbourhood of the wells use a little crude oil, but the quantity bears a small proportion to the total yield. It is manifest that oil which takes weeks or months to come from the wells to the refinery, would not pass the standard accepted at Baku, that it must be refined immediately it is raised.

METHOD OF RAISING THE OIL.

The method of raising the oil is as follows:—The wells are usually placed on the top of the hillocks that are so characteristic of the Yenangyoung district. The oil is drawn up in earthenware vessels attached to ropes. The vessel being let down into the oil which has accumulated during the night, the labourer, usually a woman, takes hold of the rope and walks down the path into the valley beneath. When the jar reaches the top, it is emptied into another vessel, and let down again; the woman now walking up the path till the vessel falls into the oil again and is filled. The oil is very thick as it is raised, and if the temperature of the air is below 80 deg. it becomes solid. Everything is of the most crude description, well, windlass, and method of working. The casual visitor going up and down the Irrawaddy might notice a few barrels lying on the sandy bank at the station of Yenangyoung, but would hardly imagine that an important oil-field lay about two miles from the bank; and, as the district is still infested by dacoits, there is little likelihood that any great change will be speedily witnessed. No sooner, however, will the country be really subjugated—for the official subjugation announced in the British Parliament by Sir J. Gorst will produce little effect on the dacoits—than an attempt will be made to work the wells by the improved methods. The company that bought the oil raised by the natives during the time of native rule, has just secured the majority of the wells, and they will conduct their operations in the future on the principles of scientific working. If oil really exists in large quantity, they will reach it by sinking deep bores. But this is a question of time, and until the industry is protected from the dacoits it is vain to hurry on the work, more especially as the price of kerosine is so low just now as to forbid the hope of any great profit even from successful working.

PECULIARITY OF BURMESE OIL.

A feature of the oil raised in the Yenangyoung field, and one that has a bearing on the source from which the oil comes, if it can be rightly interpreted, is that it has much higher temperature than that of the air. The oil as it rises from a well of, say, from 250ft. to 300ft. deep, has a temperature of 90deg., while the temperature of the air may be only 80deg. It is known that after a certain depth is reached, about 60ft. or 70ft, for every further descent in the earth of a similar distance the temperature rises 1deg. Fahrenheit. So that upon this rule the depth from which the oil comes would be about 600ft. And if the mean annual temperature be taken, the depth would seem to be even greater—according to a calculation made by Dr. Oldham some years ago, about 2,870ft. But at this point theorizing commences. What is the real cause of the high temperature of the oil? Is it due to the fact that it rises from a certain stratum having the temperature given, and whose position may be assigned from the law of secular cooling of the earth? Or does it rise from some other local cause, as, for example, some chemical action going on? There are no reliable data to go on while discussing this matter. There are many hot springs and mud volcanoes in Burmah, notably at Rumree, which is not far distant from the Arakan oil-region. These hot springs and mud volcanoes are usually found in the neighbourhood of oil-fields. At Baku there are such; and quite recently I have read that a new one burst forth there with phenomena of great brilliance, flashing of burning gas, and the throwing up of much mud. Below the Yenangyoung oil-field there may be peculiar conditions of the strata which cause the high temperature of the oil, and which, indeed, may have even been the original cause of the production of the oil. For this very question is still involved in obscurity. When I describe the Baku oil-field I gave a *resumé* of the different theories propounded—how one suggestion was that the oil was produced from the destructive distillation of coal; and another that it was formed from the distillation of the vegetable remains not yet turned into coal; and another that it was the result of a similar process operating upon the animal remains collected at the bottom of the seas; and, lastly, how a chemist had been bold enough to suggest it was due to the action of water on iron and carbon in same form at a high temperature far down in the earth. Yet none of these theories was established.

GEOLOGICAL FORMATION.

The geological formation of the Yenangyoung oil-field is of much interest. Externally the district presents the appearance of a number of little hills deeply scarred by water-courses and cut by

ravines. Except during the rains the clothing of vegetation is rather scanty. From the number of natural sections made by the ravines it is not difficult to obtain an idea of the nature of the strata. There is a little surface-clay, and after this comes tertiary sandstone and some shale. The oil is found in the soft sandstone. Below the sandstone there seems to be shale, and from what can be gathered it seems that this shale is saturated with oil. The formation thus presented does not differ very materially from other oil-fields, except the great oil-fields in America. In the American field, the oil is found in the palæozoic rocks, while in Galicia, Baku, Arakan, and Burmah the formation is tertiary sandstone.

The great difference in age between the one series of rocks and the other is suggestive of the inquiry if the oil was formed in the rocks in which it is found, or was it formed elsewhere, and did it pass into those rocks which presented the most convenient resting place? If it was formed in the rocks in which it is found, the admission would have to be made that the formation process was going on in very early ages of the world's history, and has continued down to later days and may be going on still.

GOVERNMENT INTEREST IN THE OIL.

Petroleum is so valuable as a fuel that every effort should be put forth by Government to discover what supplies may be procured from existing oil-fields. A distinction must be drawn, however, between the *astatke*, or residue of the Baku oil, and the residue from the Yenangyoung. The former contains only a small quantity of solid paraffin, about two or three per cent, while the latter contains as much as 14 per cent. The quantity of this substance found in the Yenangyoung oil residue renders it more valuable than the Russian. So much, however, of solid paraffin is made by the Scotch manufacturers by distillation of coal that the total amount got from the Rangoon works is hardly able to compete with it in the market. It is the residue after the extraction of the solid paraffin that is used for fuel. . . . Of course, there are practical difficulties still in the way, that the supply of petroleum is insufficient, and, even if sufficient, there would be a most disastrous disarrangement of system if a vessel were to use coal at one time and oil at another. The first objection is certainly overwhelming until it is rebutted; but the latter is one of detail, and may be overcome by the same ingenuity which invented the wondrously complicated machine, the modern man-of-war. This may be travelling rather far ahead; but since fuel is most urgently wanted in Burmah, and since, with the annexation of Upper Burmah the oil-field has passed into British hands, and since oil is a very valuable fuel, an examination of the resources of the oil field might well be undertaken or assisted by Government. The necessity of fuel on the north-western frontier of India has led to an examination of likely oil-fields there. A certain quantity of petroleum has been obtained, though not as yet sufficient to become the ordinary fuel. A somewhat similar inquiry may be undertaken with advantage at Yenangyoung, and in other places in Upper Burmah where petroleum is known to exist, that the extent and value of the newly acquired oil-field may be ascertained.

NITRATE OF SODA: ITS USE AND ABUSE.

By CAMBUSLANG.

SPRING-SOWN GRAINS—WHEAT, OATS, BARLEY, RYE, AND BUCK-WHEAT.

THE remarks which have been made regarding winter-sown wheat apply with equal force to spring-sown grains, the treatment of the one being very much the same as the other. Where oats are sown in autumn, they may, of course, be exactly treated as winter-sown wheat, but where sown in spring, as the above-named grains principally are, a slightly different course must be pursued. In most districts of northern Europe, the sowing of the spring grains extend from the middle of February to the middle of April. The earliest sowings will take about three weeks to appear above ground, and the late ones a little less, according to locality, variety, depth at which the seed was deposited, and earliness or lateness of the particular season. The plant, as a rule, subsists on the store of food in the seed for from two to three weeks after it appears above ground, after which, unless in favourable circumstances of soil and climate, it often remains stationary for a longer or shorter period, the blades, the meanwhile, becoming more or less tinged with yellow. Should a cold period come on at this critical stage, the after-growth of the crop may be seriously hampered, as the young plant's supply of food is now done, and it is scarcely yet able to gather food for itself.

If the district is a dry one, or one in which the spring rainfall does not exceed $1\frac{1}{2}$ inche per month, manurings of nitrate of soda may be applied broadcast to the land at seed-time, and harrowed in with the seed. In such districts or countries there is almost no loss by drainage at that season, unless in exceptional cases of wet, or too early sowing, and throughout the dryer districts of France and Germany, the results are more satisfactory than where applied later on.

Although the soil at seed-time may contain a little more moisture than at mid-summer, there is not great danger of loss, for the descending column of moisture moves very slowly, in a short time it remains stationary, and a little later it commences to ascend. Under these circumstances, what nitrate is rendered soluble by the moisture in the soil rarely descends very far until its course is first arrested and then reversed. A small portion will always be retained in the upper layers of the soil, which the slender rootlets of the young plants at once lay hold of, so that the plant, as it were, passes through the weaning stage without a check. On the very driest districts of the Continent, it is good policy to allow a small portion of the nitrate of soda to be buried at a considerable depth, the remainder being mixed up with the soil during cultivation. Under both systems, in their proper locality, the plants always have as much nitrogen as they require; they never have it in such superabundance as to cause the straw to be soft and unhealthy, and they have a supply provided for them during their whole period of growth. If under such circumstances, the nitrate of soda were applied a week or two after brairding, as is the practice throughout the greater part of the British Isles, the effect would be anything but satisfactory. The crop would be unduly forced on during the earlier stages of its growth, to be followed by a starvation period at the time when it was most in need of an ample supply of food. In dry seasons, also, a large portion of the nitrate might never become dissolved. as applied to a hay crops the lumps will often be found undissolved in July.

On the other hand, in all countries having a climate and rainfall similar to the greater portion of the British Isles, particularly the western and northern portions of them, a manuring, where necessary, of nitrate of soda should always be applied to spring sown grain as soon as it is fairly through the ground, but not before, and in the wetter districts the quantity even then must be very small.

By the time the food in the seed has become exhausted, the nitrate of soda has become dissolved and is available for plant food, as it has by that time been generally carried by the descending moisture to the roots of the young plants, which are thereby enabled to grow on unchecked, all the time presenting a healthy green appearance, and never remaining in the sitting or stationary stage at all. Owing to the low temperature of the British Isles at that time growth is rarely superabundant, although a superabundance of nitric acid may be at, or near, the roots of the plants; and owing to the excess of moisture and lack of sunshine prevalent at least, in the northern-half of Britain, there is far more danger of the nitrate descending quicker than the roots of the crop, than of lying on the surface undissolved, as might happen in a very dry climate.

Nitrate of soda applied at this stage, has also been found the most effectual dressing for oats attacked by the tipula grub. A very weak solution of nitrate renders the grub sluggish and unhealthy, and at the same time pushes the crop beyond its reach. Three weeks or so after the first manuring of nitrate of soda a second may be given, which, if thought necessary, may safely be double the quantity used the first time. The crop being now larger its requirements are greater, and the roots having penetrated the soil in all directions, little can now escape being taken up by them, unless the conditions are something very unfavourable. In most cases two manurings applied to these crops will be found sufficient; but should the season be unsuitable, or the crop not coming up to expectation, a third very light manuring may be given two or three weeks after the second. It is, however, little use applying nitrate, even in a drizzling climate, at or about the time the stalk begins to make its appearance, as such a practice only gives the crop a dark-green appearance and delays the ripening, as it is questionable if it adds anything to the quantity or quality of the grain or length of the straw. By the time the seed-stalk of any plant begins to be thrown up, all manure intended for that crop should be in active circulation in the soil; and if large heads of grain are to be produced, it must be the previous manuring which must be looked to, not so late ones as the *size* of the ear is formed in the plant previous to that and all that is now requisite is enough manure to carry the crop past the blooming stage. That period being reached, the crop appears to draw little or nothing from the soil, but moisture, its energies being devoted in transferring what is already stored up in the roots, stalk and leaves, from them to the grain. It appears to be a part of the nature of every plant and animal that no sooner have they attained maturity than their whole energies appear to be devoted to the re-production of their kind. Even a healthy growing plant in no way inclined to throw a seed stalk will, if checked in its growth by being transplanted, subjected to unusual cold, as frost or very dry weather, at once begin to propagate its kind by throwing up its seed-stalk, after which it draws little from the soil.

In the use of nitrate of soda, damp climates, although labouring under many disadvantages, have one advantage over dry ones, *viz.*, that if a crop is proceeding unsatisfactorily, it can, during the earlier stages of its existance, be helped on by applications of nitrate of soda, whereas in very dry climates such manurings never meet with satisfactory results. I several English counties, and on the Continent, I have found lumps of nitrate of soda lying on the surface, two and three months after being used. The gain to even a shallow-rooted crop, under such circumstances, is more imaginary than real, as the bulk must go to the drains or subs-oil as soon as the autumn rains come on.

A popular belief is that nitrate of soda acts as a purge on land, and that it drives out of the land all the valuable manurial ingredients it contains, leaving it in poor condition afterwards. Undoubtedly, a heavy crop removes more from the land than a light one; but does any intelligent farmer believe, because any season, such as 1879, which was a bad one over all northern Europe, that having reaped a small crop that season his land will be in better condition afterwards than if he had reaped a good one. Such is the reverse of true, for it generally happens that land which has carried a full crop one year is better prepared to carry an average one the year following. The principal reason is, that large crops being generally produced in favourable seasons require a large quantity of roots for their support, and roots being rarely taken off the land, they, when decomposed, form a valuable addition to the stock of plant food in the soil. In no course of cropping is this more clearly seen than in a wheat crop after clover, or as in Scotland an oat one. In both cases if a good crop of clover has been repeated a heavy crop of grain almost invariably follows, the large mass of clover roots slowly decaying and yielding up their manurial elements as required by the grain plants.

Large crops also occasionally entirely kill off by smothering or largely keep in check the growth of weeds, which not only hurt the crop among which they grow by robbing it of a portion of the manure intended for it, but by growing with it, they render it unhealthy by

depriving it of light and air. Both of these advantages, which without extra manuring or cultivation can only be enjoyed in an extra fruitful year, may, by the use of nitrate of soda, coupled with other cheap mineral manures, be had during any ordinary season. The extra quantity of straw produced will assist in keeping a few extra stock and the stock will produce more manure than the farm was accustomed to do, so that by the use of nitrate of soda a larger quantity of home made manure will become available for the after-production of other farm crops.

Again, in heavy land the strong roots of a good crop, after decay, leave the soil full of little channels for the admission of air and percolation of water, both of which materially assist the well-being of the crops which follow.

FOOD IN FEVERS.

"UPON the matter of food and drink may hing the recovery or demise of the fever-stricken patient. No question has occupied the minds of medical men for ages more than this. If we go back to Hippocrates, the "father of medicine," we find that he taught that fever patients should be sustained with some light diet. Since his time the pendulum of custom has swung to great extremes; at one time the fever patients being injudiciously fed, at another time they were starved. The same can be said of fluid in fevers—sometimes it has been allowed, at others withheld. Whatever course be pursued, naturally all will not get well. But by following correct dietary principles the mortality in fevers can be reduced, and many be given strength to go through the latter days of the disease, when otherwise the power would fail and the spark of life go out.

"At one time the plan of starving fever patients was carried to a great length, and in France it became quite a universal practice. Under this treatment a thousand times more lives were lost than ever Napoleon left upon the snows of Russia, or the awful massacre of St. Bartholo- mew's swept away. Following upon this custom was the teaching of the celebrated Dr. Graves. In lecturing to his students, he used to say: "Gentlemen, I want no better epitaph on my tomb-stone than, "He fed fevers." Years have gone since then, but his words took deep root and brought forth good fruit. Well does Dr. King Chambers say that the sufferings of the dying are increased by hunger. Even in the most extreme cases of disease, by carefully and untiringly feeding the patient, many a life has been saved by tender, loving hands, when the doctor has shaken his head and abandoned hope. In fever the man is parched—give him drink; he is being burnt up—give him fuel (that is, food).

"But, asks some one, can the stomach in such a condition perform its work? Read what Dr Bristowe says, "Experience has demonstrated that fever patients are capable in no inconsiderable degree of assimilating nourishment, and that the specific symptoms of their diseases are seldom, if ever, aggravated by its judicious administration.' On the other hand, as Sir William Jenner says:—"All nourishment which leaves solid residue—as milk—should be avoided.' As pointed out by Dr. Murchison and others, beef-tea and meat soups often produce diarrhœa. Of all the aliments ever given by the doctor, milk takes the precedence. It contains all the nutrient principles essential to life, and is the only safe and natural food for infants. Now the difficulty with cows' milk is this:—'When milk is drunk in any quantity the gastric juice in the stomach produces large curds, which are sometimes hard, like felt, and are very indigestible and irritating to the stomach' (Brunton). In all cases of fever, and also when, for any reason, the stomach is incapacitated for work, the milk and other food given should be pre-digested. A most effective method of doing this is with Peptonising Powders (Fairchild's process) Milk prepared with these is sweet and palatable, and will not curdle, even if strong acid be added to it. It is safe, bland, and nutritious, and has been the means of saving many a life. It is the only proper artificial food for infants. The necessity for thus modifying milk is indicated by the dangers, as described by Sir Wm. Jenner. He says:—'I have seen the patient, restless, sleepless, or drowsy, his temperature raised several degrees above what it had previously been, vomit a quantity of curd, and at once the restlessness cease, the temperature fall, the skin become moist, and the patient drop into a quiet sleep. All the threatening symptoms vanish with the ejection of the offending material'. Or the undigested curds may accumulate in the bowel, inducing flatulent distention and pain in the abdomen, restlessness, and increased febrile disturbance. A distinguished chemist once remarked to me, 'Do not forget that a pint of milk contains as much solid animal matter as a full-sized mutton chop.'"

"These words were written in 1879, and since that time the science of dietetics has undergone a revolution, and in case of disease *all* foods may now be given in such form as not to tax or encumber digestion, but prove a life-saving boon."—*Family Doctor.*

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THE

INDIAN AGRICULTURIST.

A WEEKLY

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VOL. XII.] CALCUTTA :—SATURDAY, JUNE 18, 1887. [No. 25.

Health, Crop and Weather Report

[FOR THE WEEK ENDING 9TH JUNE 1887.]

Madras.—General prospects good.

Bombay.—More or less rain in parts of thirteen districts of the Presidency Proper. *Kharif* sowing commenced in a few districts. Fever and small-pox in parts of six, cholera in parts of eight, and cattle-disease in parts of nine districts.

Bengal.—Weather close. Rain in all districts, except Gya, Hazareebagh, and Cuttack; especially heavy in Northern Bengal districts. Prospects of crops generally good, some loss is reported from excessive rain. *Aman* cultivation and *bhadoi* sowings are going on. Cholera still prevalent in Patna division. Elsewhere public health is good. The cyclone of 25th May did some damage to trees and houses on coast of Cuttack and Balasore.

N.-W. Provinces and Oudh.—Rain has fallen in several districts. The fall was heaviest in Meerut and Gorakhpore. Cane and indigo crops are flourishing. *Kharif* sowings have begun in the eastern districts. Markets well supplied, but prices are rising. Cholera has increased, and some districts report fever and small-pox. Health of cattle generally good.

Punjab.—Rain has fallen in all districts, except Shahpore, Dera Ismail Khan, and Peshawur. Health is good, except in Umballa and Peshawur, where it is fair. Prices are fluctuating in Delhi, falling in Jullundhar, Shahpore, and Peshawar, rising in Rawalpindi, elsewhere stationary. *Rabi* operations nearly completed in Mooltan, Rawalpindi, and Derah Ismail Khan. In Derah Ismail Khan, the outturn is much below the average. *Karif* ploughings commenced in Umballa and Jullundhar, and sowings in progress in Mooltan, Shahpore, and Peshawar.

Central Provinces.—Weather hot and cloudy, with slight rain in places. Land being prepared for *Kharif* sowings. Rice sowing commenced in Chhattisgarh. Fever and small-pox in most districts.

Burmah.—Cholera prevalent in Thongwa district, otherwise public health generally good. Slight cattle disease here and there. Reports received from six Upper Burmah districts. Public health and crop prospects good.

Assam.—Weather rainy. State of crops good. Prospects less favourable than the preceding week, owing to sudden and heavy fall of rain. Ploughing for *sali* crops continues, *dumai*, *Ahu* and *murali* crops and tea fair; cattle-disease in one mouza of Gauhati. Public health fair. Prices steady.

Mysore and Coorg.—More or less rain throughout the State. Standing crops in good condition. Prospects of season continue favourable. Public health good. Small-pox and cattle-disease prevalent in affected parts. No material change in prices. South-west monsoon rains set in fairly on 3rd instant.

Berar and Hyderabad.—Intense heat at Amraaoti. Ploughings for *kharif* sowings continue. Cattle-disease prevalent in Akola. Reaping of *tabi* crop finished. Slight fever in Amraoti, and cholera beginning to appear in some parts of Akola; otherwise public health fair. Prices steady.

Central India States.—Monsoon apparently approaching. Heat [illegible]. Scarcity of water in Neemuch. Prospects of crops good. [illegible] cases of Cholera reported from Rewah in five days, also four cases from Govindgarh, but not epidemic; otherwise health good. Prices stationary.

Rajpootana.—Weather cloudy and sultry, with clouds. Slight showers have fallen in some places. Tanks and wells very low. *Rabi* harvest over; *kharif* operations in progress. Sugar-cane being irrigated. Cattle-disease in Ajmere. Fever and small-pox in Dholepore, Ulwar, Bickanir and Ajmere, otherwise public health good. Prices rising in parts.

Nepal.—Weather close and sultry. Much thunder and heavy showers during the week. Prospects fair.

Letters to the Editor.

PRETENTIOUS TEACHERS *vs.* KNOWING PUPILS.

TO THE EDITOR.

SIR,—The most foolish idea that has possessed a class of Anglo-Indian writers, is that the Indian cultivators are a stupid class of people; that they do not understand their own interests, and that they do not take to new methods of cultivation, even when these methods are found lucrative. Knowing as much of agriculture as the ignorant and pretentious writers of the Calcutta dailies can lay any claim to, I say this accusation is totally unfounded. Take the cases of Swede (turnips) cultivation in Scotland, and of Potato and Jute cultivation in Bengal. Have the Bengal ryots taken to Potato and Jute cultivation less readily than the Scots took to Swede cultivation? The fact is that the pretentious men who write long articles about agriculture know as little about practical agriculture as I know of the man in the moon. These writers have each their nostrum; when they find that their nostrums, which they are careful not to spend any money in trying themselves, are not adopted by the ryots, they fall foul of the latter, and abuse them as an ignorant class of men. Take the case of tobacco-curing. Who has ever accused the tea planters and indigo planters of not cultivating and curing tobacco after the European method? while those who are ready to accuse the ryots for not understanding their interests are a legion. These writers of leading articles may not know in what contempt they are held by the cultivators of the country. But their eyes may be opened by these lines from the pen of

AN AGRICULTURIST BY BIRTH.

June 4th 1887.

Editorial Notes.

IT would appear that highly nitrogenous manures are not desirable in the cultivation of tobacco; for we note that M. Mueller gives the results of some researches he has been making with regard to the culture of this plant in a French journal, and says that it is not desirable to employ highly nitrogenous manures in its cultivation. The albuminoid matters they produce are objectionable during fermentation, and impart an unpleasant odour to the tobacco when burning. Potash manures are indicated as favouring the accumulation of hydrates of carbon. The want of 'flavour' in Indian tobacco may thus be due to this cause, for night-soil is largely used to manure tobacco fields in some parts of India.

* * *

WE are told that the year 1886 was an especially unfavourable one to Russia. She was almost hopelessly beaten by her competitors in the United States, India, Australia and South America. 1887 promises to be even more unfavourable. For the first three months of last year three-fourths of the whole supply of wheat imported into England came from the United States. There is a continued falling off also in the exports from Russia. In fact she appears to be falling so completely behind, that her harvests will have soon little effect upon the price of wheat if things go on as they seem to be tending. Notwithstanding these gloomy forebodings, telegrams published in the Russian papers from various parts state that the wheat harvest in Southern Russia seem full of promise. The reports being uniformly "satisfactory" and "highly satisfactory."

THE process of sugar refining by electricity is described as an electro-chemical one which is worked by a machine, automatic in its action to a very great extent. Boiling and animal charcoal are entirely dispensed with. No syrups nor soft sugars of different grades are produced, the entire product being hard sugars in whatever forms or sizes which it may be desirable to produce, that is, from finest powdered up to and including cut and pressed loaf. One valuable feature in this mode of manufacture is that all the saccharine matter in raw sugar whether crystallisable or uncrystallisable, under the old system of boiling and filtering, is by this system rendered into hard sugar with a small fraction of loss,—less than one per cent of the whole quantity. The cost of refining by this process is 2s. 4d. per ton, and the time occupied not more than for hours.

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A RECENT telegram from London states that the deliveries in the London market of Indian tea in May last amounted to 7,500,000lbs, as against 5,900,000lbs. cleared in the corresponding month of last year. The stock on the 31st of the month was 25,700,000lbs. as compared with 22,600,000lbs. at the end of May 1886. The quantity of tea landed in the month was 1,900,000lb. as compared with 820,000lbs. last year. Deliveries of China tea were 10,000,000lbs. as against 11,000,000 lbs. in May 1886, showing a decrease of one million pounds, and the stock was 43,152,000lbs., as against 40,109,000lbs. in 1886. The quanitity landed in May last was three million pounds, against one million in May 1886.

A GENTLEMAN of some experience discusses in another column the wheat trade of India with special reference to the speech ecently made by Mr. W. W. Petrie at the last annual meeting of the Bengal Chamber of Commerce. That the writer is well conversant with his subject, there can be little doubt. His views are, moreover, fully borne out by an article in the *Times f India*, of the 6th instant, which reads as follows :—" At the recent annual meeting of the Bengal Chamber of Commerce, one of the members, Mr. W. W. Petrie, took up the cudgels on behalf of the existing standard of 5 per cent refraction in the wheat trade. His arguments were more warm than conclusive. Mr. Petrie's suggestion that the Government are wilfully obstructive in regard to the wheat trade is not worthy of serious comment; while his querulous complaints about the recent reports by Government officials on the practices of the trade—reports described by Mr. Petrie as ' vilifying with impunity the whole of the wheat exporters of Calcutta '—are absurd. That Indian wheat is, under the present conditions of the trade, often deliberately adulterated up to and over the prescribed standard has been proved up to the hilt, and the serious allegations in regard to swindling transactions for obtaining unfair allowances in weight or in refraction have certainly not been conclusively refuted. That all the export firms, however, are tarred with the same stick and are guilty of these malpractices was never contended, and Mr. Petrie has no reason to feel personally indignant at the strictures of the Government agricultural officers or to characterise the fact of these strictures having been made as a ' disgrace.' One of Mr. Petrie's arguments may be taken as a sample of the rest. He is reported as having said :—' I am speaking with some knowledge of the subject, when I say that practically, no wheat is delivered under five per cent., while the average with the exception of what is delivered in the first month of the season, is about 6½ to 7 per cent. Of this refraction about half is dirt, straw, chaff, &c., the remainder peas, beans, barley, oilseeds, &c., and shrivelled and dried grains. *This shows that there is no room for the Director of Agriculture's advice to adulterate to five per cent.*' We italicise the last sentence. Our completion of the syllogism would certainly have been that the present condition of the trade so far from offering an incentive to produce clean wheat, puts a premium on careless cultivation or deliberate sophistication, and that advantage of this is being taken to the full. As long as every consignment of wheat, however pure, is paid on the previously fixed calculation that it *must* contain at least 5 per cent of ' dirt,' it is certain to contain this percentage, and a little more, too, on the off-chance of the sample passing muster. As we have before written, it is on the face of the argument absurd to defend a system of trade which sends home to England one ship in every twenty laden with mud and chaff, and pays freight on this cargo as if it were sound wholesome grain."

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WE are very much pleased to learn from the *Times of India* on the 8th instant that, owing to the public discussion on the subject, one of the largest houses engaged in the wheat trade is going to fix its standard for refraction at two instead of five per cent. " If one important firm gives a lead, the others must needs follow suit. Formerly, one wheat steamer out of every twenty was laiden with dirt, now it will be only one out of every fifty—and that is a step in the right direction." This is a decided step in the right direction, and cannot fail to have a good effect on the country. The Bombay exporters differ in one important respect from their contemporaries in Calcutta, *viz*: that instead of putting forward untenable excuses and blaming the Government for alleged shortcomings, they set their heads to work and strike out a new path.

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SINCE writing the above, we have seen the following paragraph in the *Pioneer*, in which our contemporary bears out our own views on the subject :—" A Bombay paper hears that one of the largest houses engaged in the export wheat trade is about to fix the standard of refraction at two, instead of five per cent. This is news which we receive with the liveliest satisfaction. During the last eighteen months we have so frequently urged the folly and waste involved in maintaining the present standard as to risk a charge of tiresome reiteration ; but if we have thereby helped to induce even one merchant to try another plan, this is quite sufficient justification. The action of Bombay in the matter contrasts very favourably with that of Calcutta. The Calcutta exporters are content to tolerate and by consequence perpetuate the existing system of tricks and dirt, and return a petulant *non-possumus* to all expostulation. We have never thought much of the arguments by which they support their position, and if a big Bombay house, after looking at both sides of the question, is willing to risk the ruin, said by Mr. Petrie and others to await all who attempt to ship wheat at a lower refraction, our judgment receives a strong confirmation. Bombay at least cannot be said to be ' too far from the sea' to know what is advantageous or otherwise to the trade interests of India."

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BY the untimely death of Mr. H. M. Jenkins, for nineteen years Secretary to the Royal Agricultural Society of England, the science of agiculture lost one of its brightest ornaments. It has been resolved to raise a fund as a memorial of the deceased in recognition of the many public services he rendered to agriculture. His premature death (at the age of 45), the heavy expenses he incurred in thoroughly educating his elder children, and the difficulties he experienced owing to chronic asthma in adequately insuring his life, prevented him from providing for his widow and six children in such away as his friends could have wished. It is therefore confidently hoped that the appeal now made will meet with such a response as will enable Mrs. Jenkins to complete the education of the younger members of the family, and to pass the remainder of her days in comfort. Subscriptions may be paid at the Regent Street Branch of the Union Bank, Argyll Place, Regent Street, London, W., to the credit of the " Jenkins Memorial Fund."

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A CORRESPONDENT writing to the *C. & M. Gazette*, states that silk-growing ought to pay well in the Kangra Valley ; both the wild silk-producing Bombyces, the common *tussur* (*Antheræa paphia* and the *arrendy* (*Attacus cynthia*) being common there. "I believe that both these insects are difficult to rear in captivity. The large green swallow-tail moth (*Actias selene*) also occurs in Kangra ; a single specimen of *Attacus atlas*, one of the largest moths in the world, was taken some years ago at Byjnath. *Actias selene* is common in Kulu, where its larvæ feed on alder. Further east they feed on *Andromeda ovalifolia*, (the *Munsoori*,) from which plant Mussoorie takes its name. It is not hard to rear, and

produces a strong silk, but very difficult to reel off the cocoons. There is also in Kulu a *Saturnia* closely allied to *S. pavonia minor*, the English "Emperor moth." A large unnamed *Saturnia* is found in Lahoul. *Antheræa Simla* completes the silk-producing moths which I know from personal observation to exist in the Punjab, but it is very far from complete. It is possibly some improvement on that one "probably *Theophila* on mulberry," which seems to be all that the Punjab Government could buy for Mr. Wood-Mason."

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A CONTEMPORARY announces that experiments carried out with the object of ascertaining the relative nutritious qualities of flour made from wheat, barley and gram, "have shown that parched gram is highly nutritious, being rich in starches, nitrogen and fat. Cakes made from the flour of parched gram are very nourishing and also palatable, and promise to be a useful and economical ration for native troops in the field. Great care in preparation of the flour is, however, necessary, as unless the husk is carefully separated from the grain before the flour is made, dysenteric symptoms are induced in some constitutions." We never had any doubt that gram "was rich in starch, nitrogen and fat." It is the custom to depreciate everything Indian, and therefore the value of this important pulse has been overlooked hitherto. We may mention that it is the principal food of the trained Indian athlete (*pahalwan*), on account of its strengthening qualities. The grain is shelled and soaked in water overnight, and eaten uncooked with the addition of a little salt. It is strengthening and nutritious, but not fattening to any extent. It forms the best food for horses in this country.

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MILDEW is a very troublesome plant-pest, especially in the case of vines. It is therefore satisfactory to learn that a new and effective remedy has been found for it, that is now being applied with success in the Gironde vineyards, which have suffered severly from mildew lately. The remedy, we are told by an English Exchange, consists in a solution of sulphate of copper mixed with slaked lime, which is sprinkled on the leaves of the vines. Though known for some time already, this mixture (the so-called "Bouillie Bordelaise") has not yet been generally applied by vineyard proprietors of this district, as it has been feared that it might have a prejudicial effect upon the flavour of the wine produced from plants sprinkled with it; and some persons have apprehended that it would affect not only the flavour of the wine, but also the health of the persons drinking the latter. How far the flavour may be affected appears to be as yet an undecided question; but that wine made from plants sprinkled with the mixture referred to cannot be injurious to health, has been proved at Bordeaux by numerous and most careful analyses. It has been found, and may safely be regarded as beyond all doubt, that the quantity of copper in 1 litre of wine produced from such plants does not exceed 1/10th to 3/10ths of milligramme of copper per litre; that is to say, it would be necessary to drink about 2,000 gallons of such wine in order to absorb about 15 to 45 grains of copper.

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THE report on Forest Surveys for the year ending September 1886 is a very satisfactory record of much work done, of which the outside public have no adequate idea. Putting aside the actual field-work done, consisting of surveys of small areas in Berar, the Punjab, Bengal, and the North-West Provinces, amounting in all to 607 square miles, surveyed at a cost of about Rs. 78 per mile on the 4-inch scale, and of Rs. 57 per mile on the 2-inch scale, no less than 297 maps in connection with forests were prepared for the Indo-Colonial Exhibition, comprising general, provincial, and other maps mounted on rollers, as well as detailed and special maps of every division of India and the trans-frontier. At the Edinburgh International Forestry Exhibition of 1884 a silver medal was awarded for the forest survey maps. Forty-nine students of the Forest School went through a course of instruction in practical surveying in the Kalesar Forests. They were probationers in the Forest Department, Forest Rangers, &c, and had previously gone through a theoretical course, including map-drawing and the use of mathematical instruments. Twenty-one of them are reported as having passed the final examinations test, and received certificates of qualification in surveying by the lower standard for the Forest Department. The remainder of the students were still undergoing their final examination in field-surveying, and most of them were expected to receive the same certificate. A new class of twenty-four students had also been formed.

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A CORRESPONDENT in Ceylon sends us the following notes regarding the jack-fruit and bread-fruit in that Island:—The chief representative of this family in Ceylon is the jack-tree (*Artocarpus Integrifolia*). This is found both cultivated and wild in many parts of the island. As a food-producing tree, it is in high esteem among the natives of the interior. The thick leathery covering enclosing the seed, and the seed itself contain a good quantity of starch. The tree produces two crops of fruit a year. The fruit is generally two feet in length and one and a half in circumference, and is of oval shape, and one of ordinary size contains upwards of a hundred seeds. When boiled and dried in the sun it forms a very good preserve—The ripe ones are very sweet, and much esteemed. Apart from the fruit, the tree is valued for its timber, which is of a bright yellow colour, and of durable quality. It is chiefly used in Ceylon for cabinet making of all sorts, and often for building purposes. By boiling the wood a permanent yellow dye is obtained, which is much employed in dyeing the robes of the Buddhist priests. Another useful and abundant plant of the same family, is the bread-fruit (A. *incisa*) which thrives well in the limy soils of the maritime districts, and is more valuable than the former as a food producer, but the wood is not of much use, except for fuel. The trees produce a starchy fruit about the size of a shelled cocoanut, which is largely consumed in the fruiting season; while large quantities are preserved for future use by boiling and sun-drying.

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WE have already referred to the cultivation of tea in the Andaman Islands. Mr. A. H Blechynden, we see, has contributed a note on the subject to the current number of the *Journal* of the Agri-Horticultural Society of India, from which we gather that it was in 1871 that Mr. O. H. Brookes, settlement officer in the Andamans, first asked the society for some tea seeds for trial in that locality. The experiment was a success, and three years later a larger quantity of seed was applied for, and several maunds were sent. Since then many maunds of seeds, principally of the hybrid Assam variety, were sent, and the tea business is now thoroughly established, there being about 287 acres under cultivation. New accommodation for the manager, (a practical tea manufacturer and planter), and new appliances for manufacture, including a first-class rolling machine, have been erected, so that in the current season a good profit is anticipated from a probable outturn of 51,000lbs. of tea. Mr. Blechynden obtained the opinion of a gentleman of experience at home on the orange pekoe tea from the Andamans, which was most favourable, for he says. "The tea may be considered very satisfactory," Another gentleman in Mincing Lane says: 'There is a want of flavor. Flavor is everything now-a-days, and to acquire it, the manager must watch its fermentation very carefully. Over-fermentation causes a *dull*, instead of a fine flavored liquor. Value of this tea is about one shilling and eight pence." Our Assam and Darjeeling tea-planters will soon have another rival in this industry.

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PROFESSOR WALLACE, of the Edinburgh University and a high authority on matters agricultural, has arrived in this country with the object of studying the agriculture of India. He is now at Simla and is expected shortly to visit Darjeeling. Upon this our Lahore contemporary facetiously observes: "The agriculture of the hills, though curious, is scarcely so instructive as that of the great plains. The learned professor might study the phenomena of dust-storms, which are said by some authorities to play a great part in the fertilization of the soil. At the present time there are thousands of tons of earth, sand and other gross matters held in suspension in the by no means viewless fields of air. Careful analyses of these clouds conducted, let us say at Jhang or near Lahore, would doubtless, if carried on long enough, yield most valuable results. The effects of genial warmth on the soil can nowhere be as

thoroughly appreciated as on the Punjab plains at this moment. Nature in short now has her laboratory in full blast, and stands ready to reveal her secrets to the Edinburgh Professor of Agriculture. It is a grievous pity that he should be diverted to Darjeeling, where the phenomena of climate, soil, and growth have but a narrow and merely local interest. Could not Sir Edward Buck send his visitor to the Punjab ? He would have a warm reception." We are not quite sure that the professor is likely to learn much of the agriculture of India by a sojourn in the hill stations.

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We have to acknowledge the receipt of the preliminary report on the Meteorology for the year 1886, prepared in the Meteorological Office of the Government of India. The report covers nine foolscap pages of print, describing in detail the observations made during each month of the year, in all the provinces of India. It is a document of great value no doubt for meteorologists, but is far too detailed to be of any interest to the general public. What would really interest the public, would be a popular summary of the peculiar meteorological features of the year, and the general conclusions to which the observations point, in the light of our present attainments in this interesting and important but most intricate study. Perhaps it is not possible to give such a summary, and yet we are slow to believe this, when we know the ability of the gentlemen who superintend and direct the labours of the department. It is a condescension perhaps that we ask of them, but if Mr. Blanford, or Mr. Elliot, would place himself in the position of the uninformed enquirer, and year after year would patiently tell us what has been ascertained, or what has been conjectured, on this great subject, and the conclusions to which the observations of the period point, the public mind would be, however slowly, educated to a general comprehension of the subject. We are not unmindful of what has been done by Mr. Blanford, to popularize the knowledge that is already possessed by scientific men, but it is by 'line upon line, precept upon precept' only that this knowledge becomes generally diffused, so as to create a positive interest in meteorological work. The department we are sure will pardon our making these suggestions.

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It is stated, we notice, by a contemporary, that the main object of preserving an Agricultural staff in these provinces, is the "fair and equitable assessment of so much of the area of the Lower provinces, as lies outside the sacred circle of the Permanent Settlement," and the writer expresses a hope that "the next Finance Commission that may be deputed for the financial salvation of the Empire, will demand, in the name of justice to the over-burdened tax-payers of other provinces, a fair and equitable assessment of the rich rice plains of Lower Bengal." The writer does not seem to know that by extending the Bengal Tenancy Act to the *khas* estates of these provinces —that is, the estates which lie outside the area of the Permanent Settlement—the Government deliberately tied its own hands, and made it impossible for it to enhance the assessments, let them be as low as they may, beyond 2 annas in the rupee every fifteen years. The *Pioneer* was the chief apologist of the Act, and we now find it expressing these futile hopes of the Government doing—what by that Act it has deprived itself of the possibility of doing. The Act has stereotyped both the revenue and the rental of the provinces, and this when the evidence was clear as the noon-day, that the assessments and the rental alike were but nominal over wide areas of the provinces. It is too late to talk about it now. What the Government should have done was to have nursed its *khas* estates with the utmost care, as the great source for a future increase of the provincial revenues, and if resolved to subvert the Cornwallis settlement with the zemindars, it should have done so honorably and honestly, by purchasing back the land and converting it all into *khas* estate. The blunder is a fatal one, and its effects will by-and-bye be painfully recognized by everyone.

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One of our Chicago exchanges writes as follows about the Hessian fly, of the ravages of which such fears are just now entertained in the United Kingdom :—

The Hessian fly is a topic on which the agricultural papers of Scotland and England are just commencing to inform their readers. We have in this office a copy of "The New Jersey Journal and Political Intelligencer, published at Elizabethtown, N. J., Wednesday February 11th, 1789, which gives among other interesting information, the contents of "The Christians, Scholars' and Farmers' Magazine." Under the head of agriculture, the contents of the magazine show that it offers "Observations on the insect denominated by some the Hessian fly." The presumption is that the "fly" has been introduced into Great Britain in baled straw from this country, of which considerable importations are made. The Hessian fly made its appearance in this country during the war of the Revolution. It is the popular belief that it came with the Hessian troops employed by Great Britain to help subdue the revolted colonies, being brought in the forage for the horses which accompanied the troops. Hence the name given in this country of "Hessian fly." Since it came to this country from the continent of Europe, it seems a little singular that it has never before reached the British islands. If it has now been imported into them from this country, it furnishes an illustration of long delayed, but certain retributive justice. Great Britain was responsible for the introduction of the pest into this country, and she now has it in her own wheat fields, and that by importation direct from this country.

This is scarcely a charitable view of the case, especially as the fly is a common enemy.

The *C. & M. Gazette* writes :—"The vastness of the empire is brought home to us anew by a wholly undeserved provincial compliment from Calcutta. An eminently respectable contemporary wishes to see 'the splendid fruit of the Punjab' brought down to Calcutta in frozen meat vans. Calcutta would have to wait longer than did the Scotch ladies for Sir Patrick Spens, ere they saw anything more splendid than warty cucumbers and bilious melons. Sometimes indeed the capital of the Punjab, which by the way has no market, nor any hope of getting one, wantons in *lichis*, boiled-wool plantains and Gujranwalla oranges. It would very much like to see some splendid fruit, nearer than Saharanpore. Calcutta may be actuated by the best of intentions, but its remark seems bitterly sarcastic to those who know the nakedness of the land." We fear our contemporary has got a little 'mixed.' The Punjab produces something better than 'boiled-wool plantains,' 'warty cucumbers' and 'bilious melons.' The peaches, oranges, plums, and loquats of Delhi would bear comparison with the best fruits of the kind anywhere. The apples, pears, and apricots of Mandi, Palampore, and the Kangra valley would not discredit the gardens of Kent ; while the luscious grapes and plums of Lahore, would bear favourable comparison with those of Southern France. Saharanpore is just out of the pale of the Punjab, and here lichees, Bombay mangoes, loquats and peaches of the very best description are to be had. The fact is that we under-value what we can procure easily; and the fruits we have named are so common, plentiful and *cheap*, that it has never occurred to any one to find other markets for them, or to develope a brisk trade in fruit.

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The following is the official Summary of the reports on the state of the season and prospects of the crops for the week ending 9th June, 1887 :—Rain in varying quantities has fallen generally throughout Madras, Bombay, Bengal, Assam, and showers have also occurred in several districts in the North-Western Provinces and Oudh and the Punjab, and in parts of Rajpootana, The rainfall was general in Burmah during the fortnight ending 4th June. *Kharif* cultivation is progressing in Bombay, the Punjab, the Central Provinces, Berar, and Rajpootana. Sowings have commenced in parts of Bombay and Rajpootana, and in the eastern districts of the North-Western Provinces and Oudh, and continue in the Punjab. The prospects of the standing crops in Madras and Mysore are good. The early rice in Bengal and Assam promises well, but the recent heavy rain in Bengal has caused some damage to the crop. Rice sowings are in progress in the Central Provinces and have commenced in Bombay. Sugarcane is doing well in Bengal, and the crop is being irrigated in the North-Western Provinces and Oudh. Indigo has suffered from rain in one district in Bengal; but the general condition of the crop is good; the irrigation of the crop continues in the North-Western Povinces and Oudh. Cholera has increased in the North-Western Provinces and Oudh, and there has been a large mortality from the disease in the Sholapore district of the Bombay

Presidency. Fever of a severe type also exists in the Ahmednagar district. In the Central Provinces fever and small-pox are prevalent in most districts. Elsewhere the public health is generally good. Prices are rising in the North-Western Provinces and Oudh, and in parts of Rajpootana and the Central Provinces, and fluctuating in the Punjab, elsewhere they are generally steady.

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THE follwing is a summary of Messrs. William, James, and Henry Thompson's forthnightly circular of India andCeylon tea, dated London 19th May 1887 :—About 31,000 packages have been printed for sale since the 5th inst., including 1,600 packages of reprinted tea and 6,200 from Ceylon. The market continues firm, and the demand for good liquoring tea of all makes between 9*d.* and 1*s.* 3*d.* has again slightly improved their value. Last week there was more inquiry for cheap Broken Teas and Fannings, but they have since been neglected. The competition for grades over 1*s.* 6*d.* does not seem quite so active as it was, and the dealers appear doubtful whether the country buyers will take them at the advanced quotations now current. The future of the market, however, may be much influenced by the important fact that the new Black leaf China Congous are very inferior in quality and low in price, the effect of which may be a scarcity of good tea with an over supply of common from China, unless operations are speedily checked, of which, according to telegrams received, there is some hope. Reuter cables that the Calcutta shipments from 1st to 15th May were 332,000lbs., 32,000 lbs. more than last year. The first auction was held on the 12th, about 4,000 packages being offered, reported to be of middling quality which we understand sold rather below last year's opening rates on 3rd June. From garden musters to hand we think that the new teas may be well received here, as they have nice fresh flavour and are well made, although as usual rather weak in cup. It is anticipated that after next Monday, sales here will be suspended for a while, as Tuesday will be her Majesty's birthday, while Epsom races and Whitsun will follow : there will be little left to sell ; not more we estimate than from 40,000 to 45,000 packages in all to finish the season's business.

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THE cultivation of opium in China appears to have largely developed within the last year or two. The correspondent of a China paper reports, that in one locality the quantity of land now covered with poppies is immense compared with that of last year. In another, large tracts are stated to have been brought under this cultivation, and similar evidence is given of a third region. Upon this a contemporary writes: "The Pekin Government, it may be remembered, declined last year to sanction a proposal made by Sir Robert Hart, the Inspector-General of Chinese Customs, to levy a tax on native opium, and this fact, coupled with the evidence forthcoming of the increase in poppy cultivation in China, would seem to indicate that the Imperial Government is not averse from inducing the Chinese to supply their wants in the matter of opium from home grown stocks. The feeling is natural, and it may be expected that the Chinese authorities will for the future abstain from those denunciations of the cultivation and use of opium in which they have so freely indulged in times past. It may be doubted, however, whether the expectation, if such are cherished, of ousting foreign opium from China by means of the home-made drug will be realized, so far at least as the opium which goes to China from India is concerned. Indian opium holds its own in the China market, not by reason of its cheapness, but owing to its quality. The Chinese are willing to pay for the brand, to borrow a phrase from a kindred industry. Good wine holds its own, although the market for cheap varieties has been much extended within recent years. So also, it may be expected that Indian opium will be in demand in China as long as its quality is maintained, or until the Chinese learn to produce at a less cost an article of equal or superior merit. At present the home-made article does not appear to be thought much of by Chinese connoisseurs in the drug; and so long as this view prevails, the prospects of Indian opium in the Chinese makets are probably safe,"

ON this subject the *Hong-Kong Daily Press* says :—The extension of poppy cultivation in the neighbourhood of Shanghai, to which the *N. C. Daily News* drew attention a few days ago, is a fact well worthy of note. It proves conclusively that the opposition of the authorities to the opium trade is, as we have always contended, a pure fiction. The British Government has consented to the taxing of foreign opium to an extent which, though not absolutely prohibitive, must necessarily restrict the consumption of the Indian drug to the more well-to-do classes, and place it beyond the reach of the poor. If the Chinese Government were really in earnest in its professed disapproval of the opium trade it would, having made arrangements which will restrict the use of foreign opium, at the same time enforce prohibitive laws with respect to the native article. But the contrary is the case. Not only is no attempt made to put down the cultivation, but the proposals mode by Sir Robert Hart for the taxation of Chinese grown opium have been rejected. The natural consequence is that cultivation is spreading in all directions not only in remote districts which may be beyond the ken of officials, but in populous and thoroughly organised districts such as those reached from Shanghai in the course of a shooting trip. The circumstance is not a satisfactory one. Opium,however harmless it may be as used by the Chinese, is nevertheless a luxury, and it is not a healthy sign to see land turned from the cultivation of food to that of an article which is in no sense a necessary of life, except as regards the small quantity required for medicinal purposes. It is generally recognised that taxation should largely fall on luxuries, and on this ground the Chinese Government would do well to impose a heavy excise tax on native opium. This would at once add to the revenue and, by increasing the price and therefore limiting the consumption, place a check on the tendency to devote the land to a crop which cannot add to the true wealth of the community.

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THE tea industry is doubtless looked upon as a very profitable one. In addition to the other places where it is cultivated, we may at no distant date expect to hear of Guatemala tea. We note that the *Guatemala Star* is urging the Government of that republic to foster the cultivation of tea in the following terms :—"A wide field is offered to prospective tea growers in the large uncultivated tracts of land on the sides of the hills and mountainous regions of the country which are admirably adapted for the purpose of cultivating the fragrant leaf. The soil is just the thing, and the climate is all that can be desired. Here in Guatemala, as is done in China, tea can be raised by the poorer classes, in small quantities, who can cultivate a few hundreds of shrubs on their own lands, and either cure the leaves themselves, or sell them to their richer neighbours after assorting them according to their quality. If the large *finqueros* were to assume the responsibility of extensive tea plantations, it would give employment to the very many destitute and labour-seeking Indians, who are now very poor and desirous of having a wider field for their labours than is afforded them in the present, less than semi-cultivated state of the country. Men, women and childern could all alike be employed in cultivating the plant, and in picking and curing the leaf. This employment would not last, like in the cultivation of the coffee tree, for two, three, four or five months but would extend throughout the entire year, and the benefits arising from the constant employment of the classes would be incalculable towards the political, moral and intellectual status of the country. An idea has been formed by many people who have given this subject their attention, that it will be necessary to import into the country a great number of Chinese labourers in order to make the cultivation of tea a profitable enterprise, but such is far from being the case. It will only be necessary to make a contract for five years with a dozen or twenty thoroughly experienced Chinese, in order to instruct the natives here in the various processes of tea cultivation, and at the expiration of that period, a sufficient knowledge will be gained to enable the project to be carried on by the Guatemaltecans themselves without further aid."

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THE *Star* claims that one great advantage which Guatemala will have over the rest of the tea-producing world is, that the

teas produced in this country will be upon the markets of Londondon and New York some five or six weeks prior to any other kinds, and thus its value will be greatly enhanced. Upon this, the *American Grocer* observes : " If the climate and soil of Guatemala are as favourable to the production of tea, its cultivation should become a profitable industry, and we receive from the new field tea of as rare and exquisite flavour and quite as marked in its characteristics as the coffee there grown, and which has for years been a favorite with epicures. We certainly hope the Government will lend its aid to give the industry a start and a foothold." There is one factor, however, that has not been taken into account, *viz* :, the price of labour. It is in this respect that India has the pull on most other countries.

MR. T. W. HUGHES, Deputy Superintendent of the Geological Survey of India, was deputed a short time back by the Government of India, at the request of the Mysore Government, to examine and report upon the Singareni coal-fields in that province. His report bears very favourable testimony to the value of these fields ; for he writes :—" All the circumstances and conditions of the Singareni field seem to me to indicate that there is a notable future in store for it, and in addition to supplying coal for railway and ocean purposes, it will in a short space of time be the mainstay of various industries within the radius of its influence." The coal is distributed within an area of eight miles in length, and about two miles broad, and is made up of four seams of the aggregate maximum thickness of 59 feet. Mr. Hughes has calculated that at the lowest estimate about 94 million tons of coal will be available within three hundred feet of the surface. This after allowing 40 per cent. for waste in working. A point of much importance is, that the coal in the upper seam has been found, after many tests, to be of very good quality as a steam fuel, which does not split and waste to dust, and stands weather and transport. The intermediate seams, he says, are mostly bituminous coal, capable of being converted into good coke and fit for gas-making, containing very little sulphur ; while the bottom seam is coal of superior quality. The value of these coal-fields is enhanced by the fact that in the immediate neighbourhood there are large quantities of magnetic and hematitic iron or limestone rock, and forests, all of which may be expected to prove remunerative. The railway to the coal fields is now nearly completed, so that there will be no difficulty in transporting the necessary machinery to work the coal shaft. These coal-fields are owned by the Hyderabad Coal Company, Limited, to whom Mr. Hughes' report is submitted.

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MR. WOOD-MASON, of the Indian Museum, has submitted a report on some insects destructive to the Castor-oil plant in the Bellary district of Madras. The insects are caterpillars of a brown moth measuring from 2 to 2·4 inches across the expanded wings. The moth is the *Phalana noctua melicerte* of Drury, by whom it was first brought to the notice of entomologists so far back as 1770, but is known at the present time under the name of *Achœa melicerte*. It belongs to the family *Dysgoniœ*, and was described by Hübner about the year 1818, who said : " Pupa formed within a leaf" ; and with reference to the larva (caterpillar): " Feeds on castor-oil plant in Ceylon according to Dr. Thwaites." Waker in 1852, after describing the moth and larva, said : " Pupa formed amongst living leaves." Mr. Wood-Mason quotes the foregoing writers at some length, and then characterises their descriptions as " meagre, unprecise and unmethodic ;" after which he enters into an elaborate scientific description of the caterpillar, which he calls an " animal ", (as distinguished from insect), and the information he gives us about the said animal is as follows : " The caterpillar pupates within the living leaf of its food-plant (the castor-oil plant, *Recinus communis*) to which it has lately proved a destructive pest in the Bellary district, Madras." This brings his report to a close. Now if Mr. Wood-Mason had given us something new in the way of information, at any rate over and above that already supplied by writers so far back as 1818, we should have been grateful. For instance, if he had told us how the insect migrated from Ceylon (its native habitat) to Madras, its method of attack, and how to deal with it, or something of a useful and practical nature, he would have conferred a benefit upon growers of the castor-oil plant at least. We, however, do not quite see the *practical* utility of a report such as that submitted by Mr. Wood-Mason, which can only have an interest for the trained entomologist. We might add that the uninitiated, after reading *his* description of the caterpillar, would be as wise as they were before, and would, find it utterly impossible to recognise the insect by its help. Here is a specimen of the description: "The two ochroeus sub-dorsal lines are always pale and often even bright yellow at their two edges; where they come into relations with the dorsal and lateral bands, their upper yellow line being in the latter case expanded or intensified at the anterior end of the fifth ring of the body into a yellow spot, forming with a median dorsal spot at the same level a transverse series of these yellow spots." There are references to " thoracic legs," an " infra-spiracular line," an " epicranial suture," the " clypetus" and " conical dorsal horns." Something a little less erudite, and more popular, would have suited us better.

THE INDIAN WHEAT TRADE.

[*By A. F. R. H. S.*]

THERE are some points in Mr. Petrie's speech at the annual general meeting of the Bengal Chamber of Commerce on the 25th ultimo, which appear to me to require elucidation. The wheat trade of India has now assumed such importance, that the subject cannot be too thoroughly thrashed out. Last year the Director of the Bengal Agricultural Department brought to notice the curious fact, that the general complaint against the cultivator of fraudulently adulterating the grain to such an extent as to render it almost unfit for exportation to foreign markets in the condition in which it was received by the shippers, was not very well-founded ; for it was shewn that the shippers were themselves to blame for such a state of things. The system upon which trade was carried on with the up-country dealers and middlemen allowed of no other alternative, owing to the 5 per cent deduction—or refraction, as it called—for impurities. Mr. Finucane's report, it will be remembered, induced the local Government to address the Chamber on the subject, and the result of that reference did not encourage the hope that any remedial measures would be adopted. This year Mr. Smeaton, Director of Agriculture in the North-Western Provinces, drew prominent attention to the same subject, and quoted one instance at least in which a Bombay export firm had deliberately authorised its agent to purchase wheat adulterated with grain damaged to such an extent as to be pronounced " unfit for human food " by a medical officer. Such being the case, it became a question of paramount importance for the trading community to vindicate itself against these grave charges. One or two correspondents have attempted to defend the action of traders in this respect by letters to the press ; but these cannot, I think, be regarded as satisfactory. The argument used in every instance is, that the purchasers of Indian wheat in London prefer to buy the grain adulterated to the recognised standard of 5 per cent., instead of in its pure state ; and that under the circumstances the shippers at Indian ports could not see their way to introducing any alteration in the existing system. That such a specious argument should be put forward by practical and keen men of business, seems almost inconceivable on the face of it, and yet the mischievous system was defended upon these very grounds. It cannot surely have been thought that a discerning public would accept such an utterly ridiculous plea in explanation of what, *primâ facie*, appears to be a fraudulent system of carrying on trade. Mr. Petrie's address, however, takes up new ground ; but I am reluctantly obliged to confess that even here he has failed to make out a case for the community which he represents. He brings forward three distinct points for discussion, the first two being dependent upon each other : I refer to (1) the debit and credit system of levying demurrage at Howrah, and the necessity for increased shed room at that station ; and (2) the reduction of special rates to consignments of ten tons. With regard to these two points, I have no doubt

that the wheat-dealers have a substantial grievance against the Government ; but the reasons assigned by the latter in support of their action are not so very difficult to understand, although the refusal to sanction increased shed accommodation at Howrah on the ground that, in four years the docks would be completed, does seem a little absurd. As to (2) the exegencies of trade on the present system do not suggest any other course. The up country traders had some hardships which could only be removed, I believe, by reducing the special rates to consignments of ten tons. The complaint about "petty and practically irresponsible traders who can conduct an almost unlimited business on a very limited capital," comes strangely from a Calcutta trader, when it lies entirely in his own hands to remedy the evil by transferring the trade to a more honest set of men. I now come to the most important part of Mr. Petrie's address, *viz.*, the 5 per cent standard of refraction. Here again the speaker simply reiterates the old argument, that it is the cultivator who is to blame for the adulteration and dirt. The cultivator, it has been shewn, finds it to his interest to do so, for the simplest of all reasons, that the Calcutta or Bombay merchant refuses to believe that it is possible for the ryot to supply him with pure wheat, and consequently, whether he supplied clean or dirty grain, he would get no higher prices for it. Mr. Petrie is completely silent on this subject. It is illogical to suppose that if better price were offered for wheat free from dirt and adulteration, it would not be forthcoming. Once let it be generally known that none but pure grain will be accepted, and that no deduction will be made for impurities, and I have very little doubt in my own mind that the up-country traders would soon see that, it was to their interest to meet the requirements of the exporters. The contention that the wheat export business offers no inducements as a profitable investment, does not appear to be borne out by the facts brought to light in the latest trade returns. I find that the exports rose from about $1\frac{3}{4}$ million cwts., valued at nearly 492 thousand pounds in 1874-75 to over 22 million cwts, valued at something over 8 million pounds sterling in 1885-86. These figures are eloquent, and need no comment.

GARDENING IN CALCUTTA.

XV.

FERNS : SELECTION OF VARIETIES.

THE proper selection of varieties is of course the first step essential to success in fern growing. Too frequently, however, but little discrimination is shown in doing so ; on the contrary, we may often find in a collection, examples from almost every part of the world, and all perhaps treated in precisely the same manner ; the grower in his ignorance, making no distinction between species that may be indigenous to hot arid districts, or those that are found at an elevation of eight or ten thousand feet. How often do we see attempts made to cultivate many of the beautiful species that are found in the Darjeeling district, and their unfortunate owners seem surprised that their efforts in almost every instance prove a ludicrous failure.

ADIANTUMS

The genus *Adiantum*, or what are popularly known as Maidenhair ferns, is undoubtedly the most useful we have, and withstands the effect of a hot, dry climate better almost than any other ; but even amongst these there are a large number of species that it would be quite useless to attempt to grow on the plains ; these are either natives of a cool climate, or found at very high elevations. Some are of the greatest utility for making bouquets and wreaths, and foremost amongst them is *A. cuneatum*, the commonest, and one which is not very likely to be eclipsed by any new comer. Besides the natural gracefulness common to the fronds of that species, it has the immense advantage of producing them more plentifully than most of the others, and will, no doubt, for a very long time yet remain a general favorite. Then comes the variety *A. cuneatum gracillimum*, with fronds much more finely divided and much smaller pinnules. When first brought out, some fifteen years since, it promised not only to rival but even to supersede the old species from which it originated, and as it is quite as free a grower in a cool climate, and its fronds also produced in great quantities, strong hopes on the subject were entertained, but there were never realised. For the same purpose also, *A. decorum, fulvum, scutum* and *mundulum*, although not so much in demand, are very useful. For large [illegible] where green foliage is often required for intermixing with flowers of more than ordinary sizes, what can be more appropriate, or produce a better effect, than the massive fronds of *A. farleyense*, the light-coloured fronds of a *Cardiochlaeum* and *tenerum*, or the darker ones of *A. formosum* and *Sanctæ Catharinæ*. But it is not for cuttings only that *Adiantums* are so much appreciated. There is no tribe equal to them amongst ferns ; indeed a judicious selection of the best sorts only will produce a greater variety of forms and tints than can be found in any other. There are the dwarf forms of *A. cuneatum* such as *Mundulum, Legrandi, Pacotti*, all of recent introduction, very pretty and very useful ; also the older *A. Luddemannianum*, perfectly distinct from every other form. Then there are the gigantic forms above mentioned, and besides them the old and popular *A. trapeziforme, Pentadactylon, Peruvianum* and *Seemanni*. Then, again, we have others, the shape and general habits of which are totally different from ordinary *Adiantums*, such, for instance, as *A. asaræfolium* with its broad entire fronds perfectly round in shape and measuring sometimes as much as three-and-a-half inches across ; the curious and better known *A. reinforme*, with kidney-shaped fronds borne on long shining stalks, and the very strange *A. Feri* whose scandent fronds expand to great dimensions, and whose stalks are quite hairy and of a ferrugineous color. But above all, there are some, such as *A. Hendersoni*, with a metallic hue ; *Macrophyllum*, whose broad fronds, in their young state, are of a beautiful rosy colour; *Rubellum, Tinctum* and *Veitchi*, all are splendidly tinted in their young state ; then we have *A. sulphureum* and *Williamsi*, and the silver one, which has become very scarce of late, *A. scabrum*; also the pendulous forms so well adapted for baskets, in which they make beautiful objects, *A. Edgeworthi, Caudatum, Ciliatim*, and *Lunulatum* ; so that I may confidently say a collection of *Adiantums* alone is most interesting. The curious property of repelling water belongs to most of them, which, if kept submerged, will, when taken out be found as dry as before. The following varieties can be strongly recommended :—

A. Amabile.—This graceful species is a native of Peru, and produces fronds upwards of 24 inches long and 14 inches broad, of a light green colour. They are very elegantly cut, and have a charming drooping habit. This plant has the peculiarity of reproducing itself on its own roots all over the pots.

A. Anciteuse.—A very elegant free growing species of maidenhair fern introduced from the island of Aneiteum. It has a creeping rhezome clothed with dark coloured scales, and three or four times divided deltoid fronds. The numerous segments of the fronds are rhomboidal, nearly sessile, firm in texture, with a glabrous surface.

A. Bausei.—This variety, though partaking of some of the properties of *A. Scutum*, is quite distinct from any other form by its pinnules being contracted ; the fronds are produced from a crown in great quantities ; they are erect and of a beautiful light green, the general appearance of the plant is that of a weeping *Scutum* of strong growth.

A. Brasiliense.—A gigantic growing fern from Brazil, the fronds often attain a height of 3 feet, and are produced from a stout rhizome creeping under ground, but very slowly. The stalks are hairy and brown, whereas the pinnæ of dark green, are smooth, rhomboidal in shape, and produced far apart, a distinct and beautiful variety.

A. Caudatum.—A distinct and handsome species, very common in many parts of Bengal. It is an ever green variety well adapted for baskets ; the fronds are pinnate, about fifteen inches long, and proliferous at their extremity; they are hairy and of a dull greyish-green colour. In a hanging basket this plant makes a charming object, as it is not unusual to see from the same specimen three generations of plants hanging down 3 feet long or more.

A. Ciliatum syn, *A. Edgeworthi*, somewhat resembling the preceding, but its fronds are double the size of that variety, with the pinnæ boldly cut or fringed.

A. Cardiochlæna, syn. *A. Polyphyllum.*—One of the largest varieties in cultivation, the fronds frequently attaining a height of 4 to 5 feet, and are of a peculiar light shade of green, and should be grown in a very shady position to retain their remarkable colour, which is apt to become almost white in a strong light.

A. Concumum.—This is a well known old variety and certainly deserving of a place in every collection. Its fronds, produced from a crown, often reach two feet in length ; they are tri-pinnate, and of a very light green ; their stalks are very black. The pendulous habit of this plant makes it a beautiful object when used as a basket plant and suspended from the roof.

A. Cristatum.—A very fine fern from the West Indies, of a dark green colour, and of stiff or rather rigid growth. The fronds, which are tripinnate, are somewhat triangular in shape and produced from a thick under ground rhizome.

A. Curvatum.—A very fine species from Brazil, producing from a thick under-ground rhizome, its fronds, which are very distinct from any other *Adiantum* as the pinnæ being much curved backwards give them a very peculiar appearance ; they are large tripinnate, and bright green in colour, and under good cultivation attains the height of 2 feet : should be grown in a shady position.

A. Decorum.—A well known and extremely handsome species from Peru, somewhat resembling *A. Cuneatum*, but of gigantic proportions. The fronds are larger in all their parts than those of the above-named species, and they are produced in great numbers from a tufted crown. It is of a lighter green than most *Adiantums*, and is a very useful plant for decoration.

A. Farleyense.—This splendid *Adiantum* is by far the most interesting of the whole tribe, and might with justice be called the queen of the maidenhair ferns. It is too well-known to require a very elaborate description, which however good and complete would most likely fail to do it justice. It has immensely broad quadri-pinnate fronds, and gracefully drooping, from two to three feet in height, and when grown in a suitable position with plenty of light, the pinnules, which are of an enormous size, beautifully cristate, deeply fringed, and with almost crispy lobes, are very prettily edged with a delicate pale crimson tint, turning to a pleasing rich light-green when mature.

A. Formosum.—This fine strong-growing New Zealand species is one of the most ornamental ferns in cultivation. The fronds, which are quadri-pinnate, light green in colour, and from two to three feet high, are produced from slender under-ground creeping rhizomes. They are erect, or nearly so, with small pinnules and hairy rachis, and their stalks are of a shining jet black.

A. Gracillimum.—A most elegant fern, with light and graceful fronds, the multiplicity of numberless and minute pinnules, and

almost invisible ramifications of the rachis, give to this plant a particularly charming appearance. The fronds, which are produced in profusion from a tufted rhizome, reach about 12 inches in length and 9 inches across, and are thin and fragile in spite of their massive appearance, their colour is a very pale yellowish-tinted olive green.

A. Hendersoni.—This fine species grows from 18 inches to 24 inches high. The fronds are produced from a decumbent rhizome; when mature they are of a beautiful dark-green colour, the young ones being of a very rich bronzy crimson, which tints they retain for a very considerable time.

A. Lunulatum.—A distinct and very handsome deciduous species, very common in Bengal, where, during the rainy season, it grows in profusion on old walls and at the roots of trees, especially the mango and cocoanut.

A. Luddemannianum.—A remarkable variety, quite unlike any other maiden-hair fern in cultivation. Its peculiarity consists in the pinnules being crested or agglomerated at the extremities of the stipes, they are also much crisped and curled. The fronds grow erect, 8 to 12 inches high, with smooth slender stipes, at first a deep crimson, changing to ebony black when mature.

A. Palmatum.—A very handsome species, very distinct in habit, the fronds are thrice pinnate, gracefully arching and spreading; the pinnules large, in the style of *Farleyense*, but much more deeply cut or lobed in palmatic form. This is a native of Peru and is found at an elevation of upwards of 10,000 feet, it is therefore only suitable for growing in a cool climate.

A. Peruvianum—This species, native of Peru, is undoubtedly one of the finest of the large-growing section. Its stout black polished stalks rise to a height of about 15 inches, supporting the ample and gracefully pendent fronds which grow to a length of upwards of 2 feet. They are produced from a thick decumbent rhizome, and are beautifully arched, they are compounds and made up of large pinnules, of a beautiful dark-green when mature, and of a soft metallic hue in a young state.

A. Scutum—or more accurately, *A. Gheisbrighti*—is a fine large-growing kind, with somewhat the habit of *A. Farleyense*, but less dense. Its beautiful fronds are tripinnate, somewhat ovate, from 18 to 24 inches in length, and produced from a thick crown; the pinnæ large, slightly crenate on the margins, are of a bright green colour; the stalks and rachis are black and shining.

A. Tetraphyllum gracile.—A handsome fern of moderate stature, and remarkable for the beautiful reddish tint assumed by the fronds when first developed, and continuing until they are fairly expanded. The fronds are bi-pinnate, on slender black stipes, arching elegantly at the top, and dividing into from four to six linear pinnæ.

A. Victoriæ.—A handsome decorative fern, of dwarf, densely tufted habit. Fronds ovate bi-pinnate, with about one pair of compound pinnæ and four to five simple ones; pinnules large, bluntly deltoid from a truncate base, or sub-rhomboidal deeply lobed.

A. Williamsi.—"The Golden Maiden-hair." The beautiful fronds of this species are of a bright light-green and elegantly arched, 18 inches to 2 feet long, supported by stalks 6 to 8 inches high, golden at the base, and a rachis in zig-zag about twelve inches long. The pinnules are about half-an-inch broad, and attached by pedisels about a quarter-of-an-inch long, they are membraneous and of a semi-circular form.

RUS IN URBE.

Miscellaneous Items.

THE quantity of wheat exported from the Central Provinces from the 1st of October, 1886, to the 28th of May last, was 2,123 077 bags of two-and-a-half maunds each, as compared with 1,996,627 bags exported in the corresponding period of last season.

THE latest reports from the tea districts are that the weather in Assam has been, on the whole, very favourable, but in the Cachar and Terai districts blight has become prevalent, and in Darjeeling complaints were made of the coldness of the weather which stopped rapid flushing.

AN experiment in ostrich farming is being made in the North Island, New Zealand. Mr. Victor Nissen having imported forty-seven birds from the Cape of Good Hope. The procuring of the birds and their conveyance from South Africa, was a matter of great difficulty and large cost. The price of the birds and freight amounted to over £12,000

WE understand, that owing to the strong south-west wind, the pearl fishery in Ceylon was proclaimed closed on the 2nd instant, and most of the divers and boatmen were allowed to go; many of the officers were also paid off. On the 5th instant, as there was a lull, the divers and boatmen who stayed behind renewed their efforts, and obtained 245,234 oysters. The Government share realized Rs. 2,832. The total sum realized, including the sale of the sample pearls, amounts to Rs. 3,96,626.

THE latest published reports from the indigo districts mentioned that rain was generally wanted both in Bengal and Behar, the plant in the latter district having begun to suffer from the long continued drought. In the North West Provinces and Benares the plant was very small and backward. But since then rain has fallen in most of the districts, which will no doubt have done much good, except, perhaps, in those districts, such as Midnapore and parts of Purneah and Behar, where the fall has been excessive.

THE wood pulp industry in Norway for the year 1880, shows a a very large increase upon the figures of a few years back, albeit prices have ruled very low. The cause for this is attributed not so much to over production as to excessive competition among the sellers of this article; and as a great many sales for forward delivery have been been booked, at extremely low prices (2l. 15s. f. o. b. Hull has in many cases been taken for wood pulp, with 50 per cent water). there are no immediate prospects of an improvement. The quantity exported during the year 1886 is about 120,000 tons; in the year 1885 it was 107,651 tons; 1884, 88,220 tons; 1883 70,464 tons; 1882, 58 884 tons; 1881, 42 194 tons; 1880, 26,055 tons. Several of the old works have extended their production during the past year, and several new establishments are in course of erection, so the production this year may probably be put at 150,000 tons wood pulp, with 50 per cent water. There have been four cellulose manufactories at work during the past year. Two for the production of soda cellulose, have worked with considerable success; two have produced sulphite cellulose: one of the latter has been burned down. Nine more manufactories for sulphite cellulose are being built with a capacity of about 10,000 tons dry cellulose. The greater part of the Norwegian wood pulp is exported to England, France and Belgium; in Russia the increase in the duty has stopped business, and the same can almost be said of Germany. America, too, has drawn part of her supply from Norway, but this trade is not expected to continue.

IN the course of an interesting paper on the botany of Cremona violins, Mr. Walter Gardiner mentions that the tung, or wood oil of China, is alleged to be the principal factor in the varnish of these celebrated instruments, The oil in question is derived from the seeds of a Euphorbiaceous plant (*A curites cordata*) This is a deciduous tree which grows in China and in the mountainous parts of Japan, and is cultivated for the sake of its oily seeds. In Japan it is especially cultivated in the provinces of Ech'zen, Wakasa, Suruga, Iwami, &c. In China it is used in great quantities and is also exported from various centres—for example, Hankow, Shanghi, Chefow, Chinkang and Ningpo. The oil is poisonous and of a purgative nature. It also possesses other remarkable qualities. When fresh it is devoid of colour, odour or flavour, but when exposed to the action of light it assumes after a time a brown tint and suffers chemical change. With its specific gravity of ·9362, it is actually the densest of the drying oils, and in the latter particular its drying properties are said to exceed those of any known oil. Heated from 100° to 200° C., out of contact of air, it retains its fluidity after cooling, but in contact with air it solidifies, melting again at 34° C. The Chinese employ it very largely for varnishing wood work of all kinds from small boxes to large junks. The Japanese on the other hand use it for lighting. Chinese wood oil must not be confounded with ordinary wood oil, or *gorjon* balsam, which is used for such purposes by the Malays, as tung oil is used for by the Chinese. There was a specimen of tung oil in the Japanese section of the Health Exhibition. It was presented to the Pharmaceutical Society and was examined by Mr. R. H. Davies who found it to possess the peculiar properties above described. Mr. Gardiner throws out the suggestion that the oil should be imported into this country.

Selections.

THE FOREST FIRE AT MURREE.

TO THE EDITOR OF THE "PIONEER."

SIR,—I was surprised to see a letter from "S," in your issue of yesterday (24th ultimo) declaiming against the fire protection of pine forests. "S." apparently thinks that Forest officers pay more attention to theory than to fact, and that, although they devote the whole of their energies to forest conservancy, they have not yet been able to discover the important fact that it is safer to burn pine needles early than to attempt the protection of the forests. "One swallow does not make a summer," neither does one disastrous fire prove the fallacy of fire protection. Terrible fires in pine forests are common in countries where regular protection has never been attempted: notably in America, where a year or two ago the capital of British Columbia was half-destroyed by a fire carried from the adjacent forest by a high wind.

I am not acquainted with Murree, but, having had some experience amongst similar forests in Jaunsar, I venture to make a few remarks on a subject in which I take a great interest. The blue pine (*Pinus excelsa*) is of all Himalayan trees, the one most susceptible to fire, and in Jaunsar it occupies the zone of vegetation in immediate proximity to the villages. When these forests were demarcated and fire protection first started in 1872, their state (I am talking of the blue pine forests, some of the fire forests being magnificent), was deplorable in the extreme. Open grassy hill-sides, where all the pines had been burnt out, were to be met with everywhere, whilst on some slopes there were still the remains of what had once been a pine forest, but now containing scattered old trees of blue pine and deodar, many of them half-burnt through. In certain damp localities only, where fires did not occur every year, could the stock be really called a forest. What then has been the result of their protection from fire during the past fifteen years? The greater portion of the previously bare slopes are covered with a magnificent young growth of the pine in question, the plants growing so thickly together as to form often an impenetrable thicket, growing at the same time so vigorously that they add at least two feet to their height annually. Where a fire line passes through the middle of a blue pine forest nothing can be more striking than the difference in the condition of the protected and of the non-protected portion. Inside the line, the young trees are as thick as wheat in a cornfield, and where there are seed-bearing deodars, seedlings of that species are also coming up

in a most satisfactory manner, under the fostering care of the young blue pine; outside the line it is rare to see a single seedling. Forests of *Pinus longifolia* are more difficult to protect, as this species never forms a dense forest, and there is, in consequence, a large quantity of long coarse grass covering the ground, whilst the tree being found at lower and hotter elevations, fires are of annual occurrence. This pine, however, appears to have in a certain measure adapted itself to this state of things by developing a very thick corky bark, sometimes more than two inches in thickness, which enables it to resist fires more or less successfully, although, when once they have gained access to the wood, the tree is gradually eaten away at the base and finally falls. That reproduction is much retarded by the fires no reasonable person who has seen much of these forests, and has studied them carefully, can doubt for a moment. Where seedlings are found the spots have probably escaped being burnt for two or three years, for when the young pine has once established itself, even if burnt to the ground, it has a power of coppicing quite unusual amongst conifers. There are no large areas covered with *Pinus longifolia*, protected from fire in Jaunsar; but those that have been protected although they have been burnt on more than one occasion, still show a marked improvement in the neighbouring and unprotected areas.

Having now given my ounce of fact, I will consider the proposals made by "S."—(1) That cutting, without permission, of timber be prevented. This rule, I should say, is enforced in almost every Government forest throughout India, and therefore calls for no comment.—(2) That needles be burnt under careful supervision *after every fall*. This requires further explanation as to the manner in which the careful supervision is to be exercised. Does "S." think it an easy matter to control a fire when once started, or does he think it possible to prevent seedlings being burnt over such large areas as the Forest Department has to deal with? If he does so, I am compelled to disagree with him, as I believe will all Forest officers and others who have to deal with jungle fires.—(3) That seedlings from nurseries be used to fill up gaps caused by fires where carelessness had allowed needle accumulations, or where, from any other cause, the fires had destroyed natural re-production. Over such vast areas as we have to manage in India natural re-production must be our mainstay, and where we can get this it would be simply waste of money to plant. Our planting operations must, therefore, be simply to supplement natural reproduction, where this fails, or to form fuel plantations, &c., in places where forests are at present non existent. What would happen in Jaunsar if we tried to carry out rules 2 and 3? Annual fires not only being allowed, but actually caused by the Forest establishment, there would be next to no natural re-production, and practically the entire area would have to be planted up, if we wished to continue our timber operations and at the same time to conserve our forests. The area protected from fire in this division, containing chiefly deodar, pine, and fir, amounts to nearly 100,000 acres, and the cost per acre of planting would be at least Rs. 25, so that we should have to spend 25 lakhs on an operation which Nature herself, when assisted by fire protection, has been proved to perform in an infinitely more satisfactory manner.

One of the commonest arguments against fire protection is that the forests are there in spite of fires; but the reply is that forests have disappeared throughout large areas in India, fire having been the most potent agent in destroying them, and that they are now found usually in remote localities where the population is scanty, but that even in these places, now that the population is increasing, cattle becoming more numerous, and grazing requirements more urgent, fires are increasing in frequency, whilst the non-protected forests are visibly dwindling away. Many of the hill forests used scarcely to be worked at all save to supply the few wants of the hill tribes, but the formation of a hill station changes this condition at once, and it becomes an imperative necessity to take the greatest possible care of the neighbouring forests. Of course, if the conditions are such at Murree, that fires are bound to occur every couple of years or so, I quite agree with "S" that it would be better not to attempt the protection of the forests; but I cannot imagine how the conditions at that place can be so very different from those at other hill stations, such as Chakrata, Naini Tal and Darjeeling, where fires have been more or less successfully excluded for many years past. If "S." has at any time sufficient leisure to pay Chakrata a visit, I shall be delighted to show him the forests to which I have referred in this letter, and I feel confident that his scepticism regarding the utility of fire protection in pine forests will be changed into a firm belief in its efficacy.

N. Hearle,
D. C. of Forests.

Camp, *Via* Chakrata, the 25th May.

THE RICE TRADE.

AN INDUSTRY CRUSHED BY DIFFERENTIAL TAXATION.

It is a sheer waste of energy, as many have been convinced against their wills, to agitate for protection in this country; but some result should surely follow a demand for a little more free trade. At first it almost seems absurd to say so, but it is a fact, that from the want of the principle, which is considered to lie at the foundation of our whole business system as a nation, what was once a considerable industry, is languishing and being rapidly extinguished "Some years ago" says a rice miller who has communicated to us his views, "the English rice cleaning trade was an important and growing business; but its progress was suddenly checked, and by degrees rice mills in London and Liverpool were closed, the capital engaged in the business scorified, and the work people sent to swell the ranks of the unemployed The trade consists in the manufacture of cleaned white rice from rough rice with the husk, partly on, which comes from British Burmah and other places. In the process, about 60 per cent, of white rice is obtained; 20 per cent of rice flour, which is used by bakers and for sizing purposes; and 30 per cent of rice meal, which is utilized for cattle food. The rice flour and meal come into direct competition with similar wheaten products, while the cleaned rice is mostly exported

HANDICAPPED BY THE INDIAN EXPORT DUTY.

Differential taxation has undermined this once prosperous trade. There is an export duty upon rice from Burmah and India of 6d per cwt. (at 2s to the rupee), while wheat is duty free. The duty upon wheat was removed in the year 1873, and during the years 1874 85 inclusive, since the duty has been removed, the Indian wheat trade to the United Kingdom has increased by leaps and bounds till it has become ten times greater in the twelve years, but the rice trade has diminished 27 per cent during the same time. The cheaper wheaten flours and offals from Indian wheat have driven rice flour and rice meal out of the market, and the English rice trade is leaving our shores for Germany, where there are protective duties upon wheat and where rice offals are free. It is incredible at first sight that so small a duty as 6d per cwt. can influence so large a trade, but the facts are beyond doubt. The unfairness of taxing one trade in grain for the benefit of the other, can be better appreciated if we imagine in England oats being taxed and barley free, or *vice versa*. Why rice millers should suffer for the benefit of wheat millers is best known to the Indian Council. The Burmese officials for years past have protested in vain against this food taxation. The food taxation per head in Burmah is Rs. 5 10 against Rs. 2-14 in British India, and Burmah pays over £1,000,000 surplus revenue each year to the Calcutta Treasury. Only one sixth of the cultivable land is cultivated, and Burmese officials say that the loss in revenue from the remission of the rice export duty would soon be made up by the increased land tax which would be derived from lands that are now uncultivated.

THE BURMESE MILLER FAVOURED.

The export duty is levied equally upon cleaned and rough rice, contrary to the general practice all over the world. This in effect means that the Burmese miller pays 5s. less duty upon every ton of cleaned rice exported, than does the English miller who has to pay the duty upon the heavier quantity of rough rice to make his ton of cleaned, But, worse than this, rice going into France from England pays a duty of 30s. per ton, but from Burmah the country of growth, it is duty free. Hence, altogether the Burman has an advantage of £1 15s. per ton over the English miller in all rice sent to France, with the result that since the Suez Canal was opened the English rice trade to France has become utterly extinguished. It would be difficult to find a parallel instance of like injustice done to English trade by the Home Government.

LAND INTERESTS IN THE CROWN COLONIES.

The grievance extends to the Crown Colonies which are governed in the interests of the plantation owners. They levy enormous taxes on food which keep up the value of the land and keep down the value of the wages paid to the negroes and the coolies. They are not revenue duties of 5 per cent. *ad val.* such as we compel the Japanese not to exceed, but protective duties big enough to kill trade, such as the 10 per cent. to 40 per cent duties levied upon rice in the various islands in the West Indies and which have destroyed any hope of trade. It is the more anomalous, because these protective duties in favour of the landowner which cut at the root of our commerce are levied in the name of a Democratic free-trade Government.

CONCEALED IN A BLUE BOOK.

The English rice millers might have been disposed to add another chapter to the many tons of expensive printed matter—it cannot be called literature—published by the Commission on the Depression of Trade, but they saw no hope of redress, and did not wish to conceal their wrongs beneath the covers of a Blue-book. They prefer to lay their case fairly and dispassionately before the public, and perhaps when Irish grievances are disposed of and some time before the Greek Kalends, something will be done for a long suffering class of English manufacturers. A committee of the trade have had interviews with several of the members of the India Council, all of whom have expressed surprise at the statement laid before them. Mr. Baden Powell who has the matter in hand, the members for Liverpool and others have promised to do their best to help the trade in securing a remedy for their grievances, and a question will shortly be put to the Secretary of State for India on the subject.—*Pall Mall Gazette.*

CHINA *vs.* INDIAN TEA.

A gentleman engaged in the wholesale tea trade at home has sent us some interesting notes suggested by an article that recently appeared in our columns on the subject of Indian tea. He points out the distinctive properties of China, Indian, and Ceylon teas, and gives his opinion, as an expert in tea-tasting, that under favourable conditions, for infusion, no tea has yet been grown out of China that equals in elegance or flavour and refreshing properties the really good Chinese article. He adds however, that the water in which China tea is infused must be soft and pure. In hard, or limy, or irony water its properties are not drawn out, and the liquor is pale and tasteless This throws an important light on the somewhat remarkable circumstance drawn attention to in our leader, that English tea dealers recognize and cater for local tastes; one class of tea finding a ready sale in one district that would fail to meet with favour in another. Our correspondent points out that this is not merely due to special tastes, acquired by habit, but is more to be accounted for by the different waters in which the tea is infused, which vary in every locality, and have an important effect on the infusion, the precise chemical nature of which is not yet understood, but which is quite apparent to the senses

of the tea taster. Hence, in localities where the water is hard, or impregnated with lime or iron, under which circumstances China tea becomes insipid, Indian tea has a distinct advantage, giving by its superior strength and barky, grippy taste a full and rich liquor, which however, has to be modified with cream and sugar before it becomes agreeable to the palate. This beverage, in our correspondent's opinion is never so finely flavoured or so refreshing as fine China tea under favourable infusion; but as the supremely favourable conditions under which China tea is to be had in perfection are comparatively rare, there is a large field in England peculiarly favourable as a new market for Indian tea. The tea, however, must be supplied of the best possible qualites. The great desideratum to be aimed at is to combine as far as possible, the strength of the Indian tea with the fragrance of the China leaf. In our former leader we quoted a statement made by Captain Temple that a native tea grower in the Kangra district has made his estate pay large profits by supplying a quality of tea for which the natives of the Punjab have shown a liking. This preference, our correspondent says, is solely due to the fact that in the Darjeeling and Kangra districts, the tea plant most closely resembles the China variety being a hybrid, not the native indigenous Indian plant of Assam. So, in England the increased consumption of Indian tea has been largely brought about by the extended cultivation of the more delicately flavoured kinds, and especially those which combine depth of liquor and flavour. It is a matter of great nicety in the manufacture to secure this combination, as flavour along and sharp liquor means under fermentation, and great depth of liquor means over-fermentation with want of flavour or deadness of taste. The exact point between the two requires to be taken, and will vary according to the condition to the leaves and local circumstances, which only an experienced and observant manager will be able by close assiduity and intelligence to cope with.

Our correspondent says that, much of the Indian tea that reached the English market during the past season was beutifully made, better than ever before, but withal of lower quality of liquor than in any previous year. This may have been partly due to unfavourable climatic conditions, but our correspondent gives it as his opinion that, another factor has to be taken into account, namely, that as the gardens grow older the tendency is for the tea to deteriorate, becoming less fresh and flavoury and with less point and character. Thus, the bulk of the Indian tea sold last year in England was of dry, woody medium and low qualities, and, in our correspondent's opinion, it had deservedly low prices. Its cheapness, however, led to a greatly increased consumption, as the retail price was two shillings and under, a figure at which the home consumption of tea now largely runs. But it is at the same time important to note that parcels with any pretensions to point (fresh flavour) or distinctive qualities fetched relatively very high prices, in many instances bringing 2s. to 2s. 4d. per lb. wholesale on the London market, though only just a little better than the kinds fetching 6d. or 8d. per lb. Last year, writes our correspondent, the Indian growers seem to have gone in for quantity more than for quality.

The above figures show that the reverse policy will be far and away the better-paying. The increased consumption last year was more marked in the case of Ceylon tea than of Indian tea, the extra 4½ millions of the former that reached the London market being very quickly taken off in preference to the Indian growths. This is accounted for by our correspondent simply on the ground that, Ceylon tea combines the thickness of Indian with a sweet flavour almost approaching to China tea The Ceylon teas, when true in character give a soft, luscious, sweet liquoring, suitable for drinking alone. When burnt, are peculiar in flavour, it is against their use for mixing "As long", adds our correspondent "as Ceylon can produce as thick fresh teas and the new gardens do now, they will be popular. What effect time will have on the gardens remains to be seen."

One great and undoubted advantage, our authority points outth at the Indian tea trade has over China is the fact that, growers here are in close and intelligent touch with the consumers at home, and are quick to ascertain exactly what is wanted. In China, the actual growers of the tea are in absolute ignorance of its fate, and they go on year after year turning out the article in a haphazard and un intelligent way. They go in for cheapness instead of quality, and now grow comparatively little of the superior article they sent over twenty years ago, and which fetched from 2s to 3s. per lb on the London market. Hence the China tea of to-day is for the most part thin and watery, and if flavoury at the beginning of the season, loses its freshness month by month, and is therefore considered by the trade in England dangerous to hold in large quantities. If the Chinese were thoroughly abreast of the times they would at once procure Indian seed and hybridise. Our correspondent points out the danger that Indian tea will come to this state also if the tendency continues of growing for quantity rather than for quality. He concludes by giving the Indian planter a brush up. "A peculiarity of Indian planters," he writes, "is that each thinks the produce of his own garden the best, and that he should get the highest price going. If he does not obtain this, he considers himself robbed by the dealers here. It is a mistake. Tea from all parts of the world is in one focus in the London market, and its true value is compared and ascertained to a nicety according to its deserts by keen and intelligent competition." To sum up, the more important points brought out by this interesting communication are (1) that Indian tea has an advantage in competing with China tea in localities where the water is hard or impregnated with lime or iron; (2) that it has a further advantage from the fact that the Indian tea-grower is more in touch with the home market than his Chinese rival; (3) that the continued advancement in the consumption of Indian tea will depend mainly on good kinds being placed on the market; and (4) that, as a really fine tea possessed of distinctive properties, commands a price from three to four times greater than that given for the ordinary article, it will pay the Indian grower to go in for quality rather than for quantity.—*Times of India.*

INDIAN CATTLE AND SHEEP.

In a country such as India, where the agriculturist and the carrier depend almost entirely on bullocks for doing their heavy work, special attention, one would think, should be paid to the breeding of animals fitted for draught purposes. But with few exceptions the natives seem willing to allow natural selection to work unhampered, forgetful that Nature at best works slowly, and that much may be done to aid her by the judicious selection of breeds, and careful crossing. Now that interest is being shown in the improvement of Indian agriculture, and that the introduction of new ploughs, which do something more than scratch the surface, renders it necessary to have powerful bullocks, the ryots are beginning to appreciate the importance of improving the breed of their cattle. Of course it will take many years before much will be really done in this direction, still it is encouraging to see that even a few are willing to take steps to make use of the facilities offered by Government for improving their stock. The plan recently approved of by Government for purchasing sires, and placing them in selected tracts, ought, before long, to lead to a marked improvement in the breed of cattle in the selected districts. The proposal is to open a central depot in the South Arcot District. where a number of selected stock animals could be kept; these, when of suitable age, would be distributed through the district, or districts, chosen for the experiments, in the same way as is now done with stallions in the Coimbatore district.

If this scheme is to work successfully, it will be necessary for district officials to exhibit some sustained interest in the matter, for we have by no means as yet got beyond the stage in which a little interest is shown by one in power acts as a strong incentive to work in the way desired. If this interest is to be an intelligent one, the district officers must themselves know something of the subject, and fortunately the necessary information is ready at hand in the second edition of Deputy Surgeon General Shortt's work on Indian Cattle and Sheep, which was recently published. * This little book gives a tolerably full account of the various breeds of cattle and sheep which are either indigenous to India, or have been imported from other countries, along with practical instructions in their management, both in health and in disease. The Indian ox, we are told, is still met with wild in some parts of the country, but we fancy it must be very rare. The only two instances of its being shot, which Dr. Short seems able to mention, are in 1843 and 1848, and these dates are rather a long time ago. The last case we remembered to have heard of was one, in which a sportsman after having, as he thought, obtained a specimen of this rare animal, learned, to his chagrin, that he had shot not a wild ox, but one which had been turned loose in the jungle some years before as being too old for work. In any case, they are so rare that they can hardly be considered an important branch of Indian cattle. Of the cattle of the Madras Presidency, the most important are probably those of Mysore and Nellore. The Mysore bullock is from twelve to fifteen hands in height and is celebrated for his spirit and powers of endurance. The Amril Mahal herd is said to date back to the time of the Hindoo Government, but its special development for transport service was due to Hyder Ali, who, by introducing a breed of cattle from the Trichinopoly district, and crossing them with the indigenous Mysore stock produced the Hallikar breed, which is generally reckoned the best of the various breeds in the country. The importance to Hyder Ali of this superior type of cattle for transport purposes was very great. They enabled him, for instance, to march 100 miles in two days to relieve Chilambram, and, after a repulse, to draw off his guns in face of the enemy. The Duke of Wellington, when on service in India, experienced the value of this herd, and during the Peninsular war, as his despatches show, he often wished that he could have had Amril Mahal cattle with him in Spain. An interesting account of the management of these herds is given by Dr. Shortt, but it is not brought up to date, the historical account ending with 1871 since which time various changes have taken place. The Nellore breed is famous rather for dairy purposes than as draught cattle. They grow to a very large size, sometimes reaching a height of as much as seventeen hands, and when well bred, they can draw very heavy loads As milk rs they are much sought after in Madras, and some have been known to yield as much as eighteen quarts of rich milk in twenty-four hours. First class animals consequently fetch high prices in the market, cows selling for Rs. 200 each, and bullocks for from Rs 150 to Rs. 150 per pair. Bulls have bought for importation into other districts at Rs. 300 to Rs. 350 each. Various attempts have been made to obt in improved breeds by crossing the better kind of cattle, and considerable success has been met with, especially by the introduction of cattle from Guzerat, Aden, and England. But much yet remains to be done in the direction. The efforts hitherto made have been chiefly spasmodic, and carried out by individuals having no permanent interest in the country. Dr. Shortt complains greatly of the want of interest shown by the ryots—"why, they argue, should they trouble themselves about improving their cattle, which will cost money when they have none to lay out, while, by following the practice of their forefathers, things take their natural course?" This, doubtless, represents pretty accurately the opinion of a majority of the ryots, but it is by no means true of all, for many are showing a distinct and growing interest in improved methods of agriculture as is proved, amongst other things, by the large numbers of European ploughs that have been sold in the Presidency during the last few years.

Turning now to the subject of sheep, we find that Nellore comes well to the front again. The Nellore sheep is the tallest in India,

* *A Manual of Indian Cattle and Sheep, their Breeds, Management and Disease*. by John Shortt M.D., F.L.S., F.Z.S., &c. Second Edition, Higginbotham and Co, Madras, 1885.

and if well fed will weigh from 80 to 100 pounds when alive. In Coimbatore there is a wool-bearing breed of sheep and though small, these fatten well and yield a mutton which is probably as good as any that is to be had in India, though it is closely approached by some obtained from Mysore where there is another breed of wool-bearing sheep. The latter breed furnishes the chief fighting rams in India. They are very pugnacious, and not only butt, furiously, but also use their forefeet, and at times even bite. During Sir Mark Cubbon's time of office, there was an experimental sheep farm at Heraganhalli, under the charge of a European Commissariat subordinate officer. For this farm Merino rams were imported annually from Australia, and the distribution of the cross breeds raised from these has improved the sheep through, out the country to a marked extent, as regards both size and quality of mutton and wool. The farm was given up in 1863, because it did not pay its working expenses, but such expenditure as this, is repaid to a country over and over again when the experiments are so evidently successful as they have been in the case of Mysore. We have not touched on the parts of the book connected with the treatment of diseases and accidental injuries: Dr. Shortt's reputation is a sufficient guarantee that this will be found satisfactory. But there is one feature of the book which we cannot speak of with the same satisfaction, and that is the illustrations. How an author could be persuaded to allow his book to be disfigured with such dreadful lithographs, we cannot conceive. We do not deny that the characteristic features of the animals are, in many cases, reproduced, but anything less artistic we have seldom seen. Many of them are taken from photographs in which the picture has been blurred by the motion of the animal, and the lithographer has reproduced this blurring. We are quite aware of the difficulty of getting a book well illustrated in Madras, but if it was impossible, on account of the expense involved, to get wood-cuts from home, we think it would have been better to omit them altogether, rather than to disfigure with them an otherwise valuable book.—*Madras Mail.*

EXPERIMENTAL AGRICULTURE.

THE Report on the Experimental Station at Cawnpore for last *kharif* may suggest to many the consideration as to whether these institutions are really worth their cost. Except so far as it teaches us how disastrous the chance accident of a season may prove to the cultivator's hopes, we learn nothing from the elaborate series of experiments, from which the main conclusions that are to be derived are the not novel ones of the superiority of deep over shallow ploughing, and the enhanced outturn to be obtained from a liberal supply of more effective manurial agents than the Indian ryot can command. So far as such experiments prove that the system of agriculture practised for centuries in the country —however empirical we are accustomed to believe it—is after all that best adapted to the climatic conditions of at least Upper India, some small gain may be derived from failure. When once we grasp the fact that the most scientific cultivation, the most expensive manures, the most careful supervision avail nothing against the effect of a single hail-storm, we may be inclined to look with modified content on the old world husbandry, which contrasts so unfavourably in European eyes with that in which steam ploughs, elaborate machinery, and rich fertilisers play so important a part. Nor does the demonstration farm at Meerut in which the methods of agriculture found by experiment at Cawnpore to be most likely to be adopted with success in India, are utilised under the ordinary conditions of cultivation in this country promise to effect anything like a revolution in the deeply ingrained conservative ideas to which the Indian ryot is wedded and in which as the outcome of centuries of experience he is inclined to put his faith. This farm owing to the heavy expenditure on supervision and hired labour—which the cultivator rarely employs—can hardly be said to pay its way; though the crops may be a little better than those obtained by the ordinary systems in vogue in the neighbourhood. Cultivators of the *Koiri* or *Mali* class can and do raise crops on their closely-cultivated lands which equal in value the highest outturn obtained by more scientific methods.

And yet if we are to have Departments of Agriculture proper—not merely extra wheels for the Revenue coach there must be lands set apart for experiment in new staples, new implements, new methods. Every one knows how completely the cultivation of the potato, though but recently introduced, has taken its place with that of the indigenous food-stuffs. Similarly, the cultivation of indigo in former days, and of jute more recently, has shown that there were valuable staples unknown to the older generations of Indian cultivators which would be cultivated at a profit without diminishing the food supply. The problem, too, of a cheap but efficient plough, to supersede the miserable tooth pick drawn by a pair of lean bullocks, which we shall so soon see hard at work all around us, has not been solved; though it is doubtful whether the metier of an Agricultural Department is not rather the introduction of such a plough to the cultivator,—its invention being left to manufacturers, who are always ready to supply a "long-felt want." As an instance of this, we need only point to the enthusiasm with which the Bihia sugar mill has been received, superseding the old *kolhu* all over the country.

Ram Baksh is not such a fool as we are inclined to think him, and if he were a little less free from debt, and had a little capital in his pockets, he would not be slow to take up any novelty which he was convinced would *pay*. It is all a question of degree. The better classes of cultivators till their lands, and turn out crops in a fashion that shows they have but little to learn. But it is the millions of poorer cultivators, whose agricultural capital is summed up in a pair of lean bullocks and a rope and bucket for the well, whom the Agricultural Departments try and may try in vain to influence. The agricultural conditions of India are opposed to any system of large farming, and it would not be safe to assert that even large farming where it has been tried has met with sufficient success to justify its wider application. Yet it is in large farming only that the scientific methods and expensive fertilisers used in experimental stations can be employed At Cawnpore from the days when Mr. Halsey established a Model Farm on the most approved principles, till to-day when the graduate of the Cirencester College superintends elaborate series of scientific experiments, but is fain to admit himself beaten by the climate little or no effect has been produced on the mass of cultivators who live round about this little oasis of high farming. Landholders of light and leading have been induced to take up, or pretend to take up, the diffusion of the principles of improved agriculture, but it is at least open to doubt whether they are not more strongly influenced in so doing by the hope of other rewards than those of better crops or rents, than by a sincere appreciation of the principles they are supposed to preach. All this is, however, no argument against the maintenance of experimental stations any more than it is against Agricultural Department themselves. No agricultural departments which pretend to do more than supervise village records and superintend settlements would be complete without its Model Farm or Experimental Station, or whatever it may be called, in which it can experiment, as we have said, on new staples, new implements, &c. It will not do in such matters to apply too rigidly the test of "does it pay;" let it be conceded that it does not pay, and is not expected to say, but is as much a part of the paraphernalia of a benevolent Government as its meteorological reporter or its scientific botanists; and a sufficient justification will have been made out for keeping up such experimental stations as already exist, if it is not deemed advisable to add to their number.—*C. & M. Gazette.*

THE DESTRUCTION OF TREES.

THOSE who have read Orme's History of India are aware that in former years forests covered a much larger area of the country than they do now, Whole tracts at the present time covered with smiling fields and villages were in days gone by given up to the growth of trees. But as the *pax Britannica* began to produce its influence, the population increased, the forests began to be cut down, till in many places the very remembrance of them has been lost. The most reckless waste has been allowed by the Government, and till lately but little was accomplished in the way of planting Denudation has long been the order of the day, and it is now time that a return was made to compensate nature for what man has done. The future has been discounted by this destruction, and posterity must suffer for the deeds of the present. It may be asked what evil has been caused by the destruction of the trees, and we will attempt to answer the question. It is well known that the rainfall of this land has been very irregular of late years; some years the supply was more than was required, while in others scarcely any fell. It may be that the average, for a certain number of years may not be much less than in former times, but the regularity with which the rain comes down is much less, and this is accounted for by the wholesale denudation of the forests There are at times long droughts, of which the result is famine, and scientists tell us that the recurrence of this disaster would be less frequent if the trees had not been so wantonly cut down. We know that some do not hold with this view of the question, but the weight of evidence is on the side of those who believe that the destruction of the forests is an evil. There is another important matter in connection with the subject; trees help to retain moisture, and thus do a vast amount of good. Trees take in moisture both by the leaves and roots; but the amount taken up by the latter is vastly greater than that imbibed through the former, especially at the season when the juices are most abundant. The moisture not required is given off and forming into streams helps to fertilise the land. Then again the trees retain the rain that falls, and springs being formed, the land near the forests is fertilised. The result follows on the cutting down of the trees that the rivulets wanting their former regularity of supply and deprived of the protecting shade of the woods, are heated, evaporated, and thus reduced in their summer currents, but swollen to raging torrents in the rainy season. From this cause there is a constant degradation of the uplands, and a consequent elevation of the beds of water-courses and lakes, by the deposition of the mineral and vegetable matter carried down by the water. The earth stripped of its vegetable protection, grows less and less productive, and consequently less able to protect itself by receiving a new network of roots to bind its particles together; a new carpeting of turf to shield it from wind, and sun and scouring rain, The result is that in many places, the soil becomes completely sterile. In the next place, the washing away of the soil from the mountains leaves bare ridges of sterile rock, and the rich mould that covered them, swept into the low ground promotes a luxuriance of vegetation that breeds, fever, and other diseases, and renders that part of the earth unfit for the habitation of man. This is why land at the foot of the ghauts is so often unhealthy. A writer gives the following account of the effect trees produce:—"The rainless territory in Peru and North Africa establish this conclusion, and numerous other examples show that woods exert an influence in producing rain, and that rain falls where they are wanting; for many countries have by the destruction of the forests, been deprived of rain, moisture, springs and water courses, which are necessary for vegetable growth. The narratives of travellers show the deplorable consequences of felling the woods in the Island of Trinidad, Martinique-San Domingo, and, indeed, in almost the entire West Indian group In palestine and many other parts of Asia and Northern Africa, which in ancient times were the granaries of Europe, fertile and populous, similar consequences have been experienced. These lands are now deserts, and it is the destruction of the forests alone which has produced this desolation. In Southern France many districts have from the same cause become barren wastes of

stone, and the cultivation of the vine and the olive has suffered severely since the burning of the neighbouring mountains. Since the extensive clearing between the Spree and the Over, the inhabitants complain that the clover crop is much less productive than before. On the other hand, examples of the beneficial influence of planting and restoring the woods are not wanting. In Scotland, where many miles square have been planted with trees, this effect has been manifest, and similar observations have been made in several places in Southern France. In lower Egypt, both at Cairo, and near Alexandria, rain rarely fell in considerable quantity—for example, during the French occupation of Egypt, about 1798, it did not rain for sixteen months—but since Mehomet Ali and Ibrahim Pacha, executed their vast plantation (the former alone having planted more than twenty millions of olive and fig trees, cotton-wood, oranges, acacias, planes, &c.) there now falls a good deal of rain, especially along the coast, in the months of November, December, and January, and even at Cairo it rains both oftener and more abundantly, so that real showers are no rarity." In Ootacamund, we have too many trees but the country outside is bare enough. It is a pity that they are not planted where they are so much required.—*South of India Observer.*

THE MANUFACTURE OF SANTONIN.

MR L. KNAPP, the manager of the Tochimkent santonin factory, publishes some interesting particulars of the manufacture of santonin in the *Journal fur Practische Chemie.* From his account it appears that the crude material, consisting of the dried unexpanded flower-heads of the *Artemisia maritima*, a shrub growing abundantly on the saline soil of Central Asia, and of which santonin is the active principle, is made into a paste with milk of lime about 58 lbs. of the latter being taken to 128 lbs. of the flowers. The paste is next diluted with water, mixed with wood shavings and ground, the heat generated during the latter process being sufficient to dry the compound. The lime converts such constituent bodies as are easily soluble in alcohol into calcium compounds, and the santonin into a very soluble calcium salt: $2C15H18O3Ca(OH)2=Ca(C15H19O4)2$ The ground product is well cooled, and digested with a large quantity of alcohol at 65° to 70°. The liquid is then freed from alcohol, and neutralised at 70° with hydrochloric acid, by which process the calcium santoninate is precipitated. In about three to five days the crude santonin crystallises out, the liquor is run off, and the crystals washed with cold water on a filter. The liquid employed averges 160 litres per 100 kilos of seed. The impure santonin is decolourised with purified animal charcoal. The average yield of pure santonin at the Teschimkent works is 1·9 per cent of the crude material, but it would be possible, under certain circumstaces, to obtain 2·12 per cent. The loss probably occurs through the absorbing action of the charcoal.

During the process of neutralisation with hydrochloric acid a large amount of resin is separated which adversely affects the value of the product. The resin occurs partly as a sediment and partly floating on the surface of the liquid, but particles of the latter are again precipitated by adhering to the santonin crystals which sink. A specimen of the sediment after having been digested with a hot solution, of soda, in order to recover part of the santonin was found to still contain about 70 per cent of crude santonin. Santonin becomes resinous by heating it with hydrochloric acid; it is not, as has been stated by Kosmann, a glucoside, for it is capable of sublimation a property not possessed by glucosides. Santonin treated in alcohol with alkaline hydrates yields salts more or less soluble; while, on the other hand, with heavy metallic oxides it only unites under special circumstances and even then in a very loose manner decomposing on heating. Santonin resin is a combination of various decomposition products of santonin; but it is not obtained from santonin by drying, as was formerly believed to be the case. It is impossible to separate the santonin and the resin by means of solvents, but Mr. Knapp discovered an excellent separating agent in salts of lead or iron, preferably the former. These salts precipitate the resin, to the alcoholic solution of which is added a slight excess of acoetate of lead, the mixture digested for a considerable time and filtered at 60° to 70°. The lead residue has to be removed from the filtrate in order to secure the proper crystallisation of the santonin. The lead is precipitated by soda and the santonin liberated by the addition of Hydrochloric acid to the santoninate of soda. It is not advisable to treat the liquor from the diffuser directly with acetate of lead, as the former contains colouring materials which are not precipitated by hydrochloric acid, but separate, at a subsequent stage of the process, and cause the crude santonin to become impure. The by-product, or exhausted crude material, is said to be utilised for fuel, or partly made into bricks for building purposes.—*Chemist and Druggist.*

A FIND OF ASPHALT.

THE discovery, in Alabama, of a large and practically inexhaustible bed, or deposit of asphalt, opens up an entirely new and rich industry in that State of mineral wonders. The deposit is located in Morgan county, a few miles from Birmingham, and close to the Louisville & Nashville Railroad, which will make shipment to market cheap and practicable. The commercial value of this discovery cannot be computed. Of course, it will not equal the iron industry of the State, for that has already grown to enormous proportions, and is increasing daily. But the asphalt industry will become a prominent factor in Alabama's prosperity, for there will always be an active and profitable demand for the refined article, no matter how extensively produced. Asphalt has become a common article of commerce, yet very few people are aware of the fact that it is really a scarce article; that Nature, in her diffusion of bounties to man, deposited asphalt in but two or three places where it can be profitably turned to commercial benefits. The supplies of the world have for years been drawn from the great Asphalt Lake on the Island of Trinidad, which is the greatest deposit known. Alabama enjoys the distinction of being the only section of the Union in which asphalt has been found in paying quantities, and to Birmingham, which will no doubt be the centre of trade for the "new find," must we look for the most valuable paving material known. The asphalt from Morgan county has been subjected to critical chemical examination, and found to be purer and finer than that brought from Trinidad, it reaching a purity in its native state of 81 31 per cent., the remainder being coarse or fine sandy matter. No difficulty will be experienced in refining the article for paving, and even for the manufacture of varnishes and lubricating oils. A company, with ample means has been formed to work the deposit in a large way, and Alabama asphalt will no doubt soon be well-known in the commercial world.—*Industrial Gazette.*

INDIA PAPER.

THE tenuity, softness, and strength of the paper manufactured in China have sometimes given to it the name of silk paper. Many persons, deceived by the appearance or the name, really think the paper is made of silk, but a careful examination shows that it is of vegetable origin.

It was towards the end of the first century of our era that a mandarin of the palace—a distinguished physicist—discovered the secret of reducing the bark of a few trees, as well as old fabrics into a very fine pulp by boiling them in water. Out of this pulp he made various kinds of paper.

At present, *chi*, which is the Chinese name for paper is made of various materials. It is made of hemp, of the bark of the mulberry, and several other plants, especially the bamboo, of the bark of the cotton plant, of rice and wheat straw, and of the membrane found in the cocoon of silkworms.

Sometimes the substance is wholly bamboo. In this case it is taken from the largest canes, the shoots of the preceding year. After taking off the green epidermis of these, they are split into straight pieces six or seven feet long which are allowed to set for a fortnight in a muddy pond. They are afterwards washed in clean water and spread out in a dry ditch. Then they are reduced to a harl, which, after being bleached and dried in the sun, is thrown into large boilers, and after being boiled therein is pounded in mortars until it is reduced to a fluid pulp. To this pulp is added a definite proportion of a gum that the Chinese extract, through maceration, from a plant that produces long and little shoots, and the epidermis of which is smooth and is known in China under the name *hotony*.

The mixing is done in reservoirs three or four feet in depth, from which the workmen dip up the pulp with their forms. These latter are made of bamboo threads drawn as fine as brass wire, by means of a steel draw plate, and then boiled in oil until they are well impregnated with it, in order that they may not be affected by humidity.

It is said that the Chinese make paper that is sometimes sixty feet in length. It is probable that they form this of many pieces, which they skillfully unite at the moment of depositing the sheets. On coming from the form, the sheet of paper is spread upon a wall covered with a very smooth cement, and which is hollow, and heated through a furnace. The paper is applied to the wall by means of a brush in the shape of a feather. This explains the striæ that we observe on the back of the paper, while the side that has been in contact with the wall is brilliant and satiny. This mode of drying may contribute to the quality that this paper possesses of receiving impressions.

India paper has a wrong and a right side. The right side is smooth and silky, and looks as if it had been calendered, while the wrong side is rough and full of little diagonal striæ, due to the friction of the brush above mentioned.

As this paper, because of its fineness, has little resistance, and has not enough body to take an impression, it is pasted upon unsized vellum paper, which serves as a mount, and which frames it, so to speak through margins whose whiteness bring its color into relief. The pasting requires a peculiar preparation as follows: In the first place by means of a scraper, all foreign matters are removed such as vegetable filaments, hairs, earthy substances etc. Then the sheets are spread upon a large table and their wrong side is covered with a layer of thin starch or pulp paste. This pasting is done with a fine soft brush or, better yet, with a sponge. In this operation, care has to be taken to keep the paper from getting torn, and also to prevent inequalities in the paste, which would produce a disagreeable effect when met with behind the clear tones of the proofs; and special care must be taken not to let any paste get on the smooth side, since, in working off, the paper would tear or would take but a very imperfect impression.

The sheets thus pasted are spread upon cords removed as far as possible from a fire, as the latter would cause them to shrivel up. After this they may be kept for many years, either flat or in the form of rolls, but always in a dry place. When it is desired to use them they are folded into as many divisions as the size requires, and are placed in thirties upon a sheet of glass laying upon a table. On the first sheet are traced the dimensions of the design, and finally the sheets are cut with a very sharp knife guided by an iron ruler.

At present, India paper is cut to exactly the size marked by the boundary lines of the design, while formerly a margin of about three-quarters of an inch was allowed.

Half an hour before they are to be used, these sheets are interposed between the sheets that are to serve as mounts, and that have been wet as for ordinary printing. The dampness of the paper

suffices to moisten the paste and give the India paper the suppleness that it requires in order to take an impression.

When the stone is properly inked, the paper is adjusted upon the stone by means of datum marks made with a dry-point. Then the vellum paper is superposed, and through the pressure of the roller the two sheets become united in one.

Before the interposition of the India paper, it should be subjected to another inspection in order to ascertain whether it has been properly cleaned of foreign substances. Attention should be particularly directed to those parts of the paper that are to receive half-atones. Less attention may be paid to those parts that are to receive the blacks, as here the imperfections of the paper are almost always imperceptible. Even a hole in such parts would pass unnoticed, although, were there a necessity for it, this might be stopped up by interposing between the India and vellum paper a bit of India paper, not cut with the scissors, but torn irregularly, in order that the edges of the piece be not apparent on the proof.

The fineness of India paper, its color (varying from pearly to dirty gray), and the property that it possesses of taking impressions render it very valuable to lithography. This paper softens tones, blends one of them with another, harmonises clear tones with vigorous effects, and tempers their hardness, and, thus gives the print an agreeable aspect.—*Bull de l' Imprimerie et de la Librairie.*

THE GOVERNMENT CINCHONA PLANTATIONS.

The Madras Chamber of Commerce has again brought to the notice of Government, that its protest of the previous year against further extension of planting, in the Government estates at Dodabetta and Naddivattam, had not received that consideration which the Government had promised to give it, for by the Director's report for 1885 6, it appeared that further extensions of planting had been going on, till they had now reached 1,950,315 trees, whereas in the previous year the number was 1 620,741 —urging, at the same time, that as the investment of State funds in these estates had proved a conspicuous financial success, the Government might now safely relieve itse'f of the trouble, expense, and possible loss, connected with extensions, and confine its labours to securing the bark already grown or in growth According to the Government's own showing in the report, the surplus of revenue over expenditure up to 1885-86 was Rs. 495,536, or say, five lakhs in round numbers, and this large sum of money might be realized were Government now prepared to retire from the field of competition with private enterprise, and put the estates up to public auction. The Government in reply says what it said last year, that the larger number of trees on the register is due, not to extensions but to *renewals*, and that these renewals must be made in the interest of the property so long as the plantations remain the property of the State, and reiterates the grounds on which it decides to keep possession and work the estates, viz, until its Quinologist shall have succeeded in turning out a cheap febrifuge for the benefit of the fever-stricken Indian peoples—at the same time Government reserves to itself the right to sell any of its surplus bark, whatever effect that may have on market prices. Of course we are bound to accept the Government assurance that the planting of as many as nearly half a million trees in the estates last year, was of the nature of renewals, although the nearness of these renewals to the nature of extensions might seem rather conspicuous, when it is considered that the entire estate comprised, only three years ago, little more than a million trees (1,122,766). But whether they were renewals or extensions, this activity of the officials in charge of the plantations seems un-questionably opposed to the position deliberately accepted by the Government, of non-interference with private enterprise. How such vast unoccupied spaces, sufficient to add a third to the total number of trees on the estates in one year, could have arisen, is nowhere explained, and we believe can only be explained by active cutting down of old trees over considerable areas, to enable the Department to compete in the market, against bark from private estates. It is this position, as a *grower for the public market*, that planters, supported by the Chamber of Commerce, object to, as ruinous to them, and as opposed to the canons of political economy, and it is this position that the Government actually occupies, while professing to be benevolently engaged in botanical experiments, and in the manufacture of the alkaloids; in neither of which have they been able to show the least advance, although, in the one case, the Director says, bravely, that he has resorted to horse dung and cow dung with little benefit, and the Quinologist has extracted the alkaloids in a form which medical men will, with conscientious scruples only try on the pauper sick. Three or four years may not be a sufficiently long time for botanical experiments, but three or four years ought to be long enough for " one of the first Quinologists of the day " to know whether the alkaloids can be extracted in a form that will be accepted by the medical profession, and in quantity and cost of preparation unobjectionable on commercial principles. What apparatus has been at the disposal of the Quinologist, in the last 3 years, and what has become of the apparatus of the Quinologist, who deserted his post some ten years ago, we cannot say, but the Government, it is said, is now " acquiring a disintegrator and other apparatus for determining if some very cheap method cannot be discovered", &c. &c., which means that we are still somewhere in the region of " Ifs," and not very sanguine of the performance in the future, of one of the first Quinologists of the day." It is time, we think, that this fad of Sir Grant Duff's was looked in the face honestly; for what with the commercial tactics of these Government estates on the one hand, and the rigorous enforcement of the revenue demands on the other, private planters, or such of them as have been able to weather the storm up to now, are on the verge of insolvency, and must soon decide between continuing the fight yet a little longer and abandoning their estates wholesale. The animus of the department of Parks and Pastimes, is clear from the stand it makes against any assistance being given to private planters in the matter of analysis of barks, and the over-worked Government Quinologist is not to be any help to the public, except at charges which planters cannot afford, and which charges are to be his private perquisites, and all this, dispite the fact that the conduct of investigations is essentially what the Government declares to be its *raison d'être* as a cinchona planter.—*Nilgiri Express.*

INDIAN FOREST DEPARTMENT.

Admission of Natives.

Mr. B. Ribbentrop, Officiating Inspector-General of Indian Forests, has addressed an important note to the Civil Service Commission on the question of admitting natives into the Forest Department. Mr. Ribbentrop writes with the authority of long experience, both in India and in Prussia; and, moreover, being by birth a Hungarian,his opinion, as between Englishman and native, may be taken as being free from partizan or self-interested bias. He starts with the assumption that it is the duty of the Government to provide the State with the best servants for each kind of work, and he scouts as absurd the contention so frequently advanced in the native press that the Government is bound to provide employment for educated natives simply because they are educated natives. The Indian Forest Service is divided into a Controlling, an Executive, and a Protective staff. The pay for the last named ranges from Rs 6, to Rs. 40 per mensem, only, and is, therefore filled, and must of necessity be filled, by natives of the uneducated class. The Executive staff consists of Forest Rangers and Sub-Assistant Conservators, and at present amounts to 100 officers, with pay ranging from Rs. 50 to Rs. 250. Mr. Ribbentrop enforces the necessity of increasing this staff, and proposes that the number should be raised in ten years to 400 Rangers and 50 Sub-Assistant Conservators, with salaries of from Rs. 60 to Rs. 150 per mensem for the former, and from Rs. 200 to Rs. 400 per mensem for the latter. By this scale of pay this branch of the service will be placed almost entirely in the hands of natives, as Europeans would not be able to maintain themselves during the time they would draw Rs. 60 to Rs. 150 only. The enlargement of the Executive staff is more especially urged, because the Controlling staff is numerically weak, in comparison with the large extent of forests in charge of the department, but cannot be extended except at very considerable cost. For the Controlling Department, Mr Ribbentrop insists upon having officers with European training. On administrative grounds, he would object to have officers of the Controlling and Executive staffs educated at the same technical school. He further points out that the necessary technical training cannot be got in India without the establishment of a new institution, with a complete and expensive staff of Professors—three Professors of Forestry besides half-a dozen specialists for auxiliary subjects. Moreover, Europe is not only the cheapest but the best field for training, as the student has there the opportunity of inspecting the results of long continued scientific forestry, whereas in India forestry is a new departure, and the teaching her would of necessity be chiefly theoretical. It has further to be considered that a forest officer on the Controlling staff should be practically acquainted with saw-mills, tramways, wire-trams, slides, forest roads, charcoal burning, tar manufactory, &c. &c., and it is only in Europe that facilities exist for seeing and studying all these industries and works in a reasonably short space of time. While convinced of the necessity of a European training for the controlling staff, Mr. Ribbentrop points out that the service is open to all, and at present contains both statutory natives of India, and natives by extraction, all of whom have undergone this training. He contends, however, that, to secure the most effective servants to the State, the pay and the pension rules should be made equal to those obtaining in the Public Works Department, whose officers are selected in the same way and educated in the same college as those of the Forest Service. After the many wild and impossible schemes that have been laid before the Public Service Commission this one is certainly refreshing from its good sense, and its thorough practicality. And Mr. Ribbentrop's suggestions are not only sensible and practical, but they appear feasible and practicable as well.—*Times of India.*

CURIOUS EFFECTS OF FOODS.

"It is well known," writes Darwin, "that hemp seed causes bull-finches and certain other birds to become black. Mr. Wallace has communicated to me some much more remarkable facts of the same nature. The natives of the Amazonian region feed the common green parrot with the fat of large Siluroid fishes, and the birds thus treated become beautifully variegated with red and yellow feathers. In the Malayan Archipelago the natives of Gilolo alter in an analogous manner, the colours of another parrot—namely, the *Lorius garrulus*, Linn., and thus produce the Lori *rajah*, or King, Lory. These parrots in the Malay Islands and South America, when fed by the natives on natural vegetable food, such as rice and plantains, retain their proper colours.

"One of the strangest illustrations of the curious effects of food is to be found in the bee-hive. There the queen bee lives with the 'worker' bees. When the queen bee dies another is procured simply by feeding a certain larva (which they put in a special cell) with what is known as Royal Jelly An ordinary larva receives but one single meal of this Royal Jelly, and ever afterwards is fed on common food; but the queen is fed with this delicacy until maturity. Of course the queen is the fertile bee, and it owes its special unctions to a special food.

"There seems to be a certain indeterminable ratio between the food ingested and the work possible to be performed. Those who train horses know that the "hunter" requires a different kind of food from the draught-horse. The former needs a more stimulating food, the latter a more lasting one. The difference in the effects of foods is also seen in the tiger and the deer. The food of the tiger will enable it to discharge a tremendous amount of force in an instant —the food of the deer to maintain more protracted though light exertions. The greyhound is fed, in training, with beef and mutton, setters and other slow sporting dogs, with broth, meal, &c.

There is the same difference in men as regards the meat they eat. According to Kolb, the yearly consumption of meat per head 'is estimated at 136 lbs. in England, 46 lbs. in France, 35 lbs. in Prussia, and 84 lbs. in Belgium. It is larger in cities than in rural districts, and is largest of all in London.'

"Sir William Roberts says:—'Speaking generally, it may be said, high feeding in the case of man, consists mainly in a liberal allowance of meat, and in the systematic use of alcoholic beverages, and that low feeding consists in a diet which is vegetarian and non-alcoholic. On the ground of this distinction it may be said that, the European races are more highly fed than the Asiatic; that the British races are more highly fed than the Continental races; and that the inhabitants of London (owing to the larger consumption of meat) are the most highly-fed population in the world The easier classes are more highly fed than the poorer classes; the town artisan is more highly fed than the agricultural labourer.' After some correlative observations, Sir William Roberts remarks of the high-fed classes and races, that there is 'a broad distinction between them. In regard to bodily strength and longevity the difference is inconsiderable; but in regard to mental qualities the distinction is marked. The high-fed classes and races display, on the whole, a richer vitality, more momentum and individuality of character, and a greater brain power, than their low fed brethren; and they constitute the soil, or breeding ground, out of which eminent men chiefly arise.' There is a tradition in Salford 'that, though vegetarianism might suit the parents, it was bad for the children.'

"We see the effects of food especially in young children, and most markedly in the production of disease, for most of the diseases of children are prelated more or less intimately with the nutritive functions. Rickets can be produced, and often have been artificially, by improper diet; and the influence of food, as a factor in the production of scrofula, is well known. Conversely, the effect a nutritious regimen in consumption is about all the victim of the disease can rely on. There seems to be no food which yields so much force as oil, and no oil digests so readily as cod-liver oil Under its use the crooked limbs of rickety children become straight, the scrofulous sores completely disappear, the consumptive get out of bed and soon grow fat and strong. It has recently been discovered by Kepler that cod-liver oil can be dissolved, the taste not only disguised, but made delicious and pleasant, by a most delightful Extract of Malt. The *British Medical Journal* calls his 'Solution' an ideal form for administration of fat, and there appears to be no prepartion so likely to prove serviceable to infants, the aged, and invalids, and this."—*Family Doctor.*

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VOL. XII.] CALCUTTA :—SATURDAY, JUNE 25, 1887. [No. 26.

Health, Crop and Weather Report.

[FOR THE WEEK ENDING, 16TH JUNE 1887.]

Madras.—General prospects good.

Bombay.—More or less rain throughout the Presidency. Sowing operations in progress in parts of thirteen districts. Fever and small-pox in parts of seven, cattle-disease in parts of ten, and cholera in parts of eight districts.

Bengal.—Weather sultry. The monsoon winds, which came in the rear of the cyclone, at the end of May, and which brought up heavy rain, slackened at the beginning of the week, and the rainfall of the week has been moderate. More rain is expected. Crops are generally doing well, but some damage has been done, particularly in the Northern Bengal districts, by the heavy rain at the end of May. Ploughing and sowing of *aman* and *bhadoi* crops are going on. Cholera still reported in the Patna division, elsewhere general health is good.

N.-W. P. and Oudh.—The rainfall has been pretty general, but not heavy. Indigo and cane crops doing well. Supplies ample, but prices show an upward tendency. Cholera reported in most districts, and small-pox and fever in a few places.

Punjab.—Rain has fallen in Delhi, Umballa, Ferozepore, Rawalpindi, and Dera Ismail Khan, and is wanted in Hissar, Umballa Umritsar and Peshawar. Health good, except in Dera Ismail Khan and Peshawar, where it is fair, and in Umballa, where there were a few cases of cholera. Prices slightly rising in Delhi, rising in Rawalpindi, high and stationary in Shahpore, almost stationary in Peshawar, elsewhere stationary. *Rabi* crops being garnered in Mooltan, and crops reaped in Rawalpindi. In Dera Ismail Khan, the outturn is much below average. Fodder scarce in Shahpore. *Khari/* ploughings commenced in Jullundar, and sowings in progress in Mooltan, Shahpore, and Peshawar.

Central Provinces.—There has been general rain. Ploughing continues, and sowing has commenced in places. Cholera, small-pox, and fever in a few districts. Prices generally steady.

Burmah.—Health of Lower Burmah generally good. Ploughing begun in majority of districts. Weather seasonable. Reports received from seven Upper Burmah districts. Public health good. Agricultural operations going on.

Assam.—Weather rainy. State and prospects of the crops good. Reaping of *dumai* and *murali* crops commenced. Cultivation of *sail* crops continues. Planting of sugarcane over. General health fair. Prices stationary.

Mysore and Coorg.—Slight rain in Bangalore, Kolar, and Tumkar districts, and heavy in Shimoga, Kadur, and Hassan, and other districts. Standing crops in good condition. Sowing of rice commenced. Prospects of season favourable. Public health good. Small-pox and cattle disease continue in affected parts. Prices slightly risen in Tumkar district and fallen in Hassan district.

Berar and Hyderabad.—Weather hot, with occasional showers. Field preparation for *kharif* sowings continue. Sowing of cotton commenced in Akola taluka ; cholera and fever prevalent. Prices steady.

Central India States.—Rain general, but weather hot. Prospects of crops good. Cholera in Rewah and Agar districts ; otherwise health good. Prices stationary.

Rajpootana.—Rain has been pretty general, but wanted very much in some parts. Heat great. Tanks and wells continue low. *Kharif* operations in progress. Outlook favourable. Fever and Small-pox rather prevalent ; otherwise health good. Cattle disease also prevalent in parts. Prices fluctuating, but have an upward tendency.

Nepaul.—Weather seasonable. Prospects fair.

Letters to the Editor.

WHAT IS MANURE ?

TO THE EDITOR.

SIR,—Commenting on the letter of a correspondent, you state that "there are scores of indigenous manures in India quite equal to any of the foreign artificial products."

Very few persons seem to have a clear notion of what constitutes manure. It seems to me that anything put in the dung heap is manure. The Santhals and Kols of Bamonghattie appear to be most careful about manure. There is nothing that they waste ; any dirt, which Lord Palmerston defined to be 'a thing out of its place,' finds its place in the dung heap, and becomes manure instantly. The dung heaps of the ryots are at some distance from their houses. The sweepings of the villages always find their way every day into dung heaps, and the result is that the homestead sites are very clean, and there is no want of manure.

It is worth the while of the Inspector-General of Sanitation, and of the Director General of agriculture, to pay a visit to Bamonghattie and other places where the homestead sites are kept scrupulously clean, and every species of dirt is turned into manure. The villagers of Bengal would be gainers in every respect by following the examples of these *Kols*, *Santhals* and *Kurmis*.

S. DATTA,
Settlement Officer.

Mourbhanj Raj.

Editorial Notes.

A SENSIBLE step has been taken by the Behar Indigo Planter's Association, in deputing one of its members (Mr. Collingridge) to Java, to make enquiries about indigo cultivation in that country. The Bengal Government is defraying a portion of Mr. Collingridge's expenses, and he also carries letters of recommendation from the Government of India. The object of the visit will be to try to discover how it is that the Dutch planters turn out indigo superior to that manufactured by their brethren of Behar. The step is, however, a curious commentary on our boasted advanced knowledge of agriculture.

WE invite the attention of our readers to the article in another column on the wheat trade of India. The writer is a practical man, and his experiences may help the trade in arriving at a satisfactory consideration of the question. It is true that the trade from the cultivator's point of view has not been discussed yet, and it certainly never occurred to us that the ryot laboured under so many disadvantages in the disposal of his field-crop. We can understand now why it has been found so difficult to induce this unit (to quote the writer), to send his grain properly cleaned to the market. The subject is of sufficient importance, we think, to be seriously taken up by our great exporting firms.

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AN English exchange hears from a continental source that the Russian Ministry of the Imperial Domains is about to try cinchona-planting on an extensive scale in the neighbourhood of Tiflis (Caucasus). Experiments are said to have demonstrated that the soil and climate of that part of the Caucasus are very suitable for cinchona growing, and it is claimed that cinchonas have actually been grown in the Caucasus, and yielded a bark suitable for quinine manufacture. We are not

in a position to judge of the accuracy of the report, which, it should be said, emanates from the same journal which announced the impending appointment of "Dr." Ritchie as British "Minister of Public Health."

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A RANGOON correspondent writes as follows :—"There is at present a great demand for rice at Mandalay, and there has been for some time past. The price is now Rs. 12 per bag and has been as high Rs. 18. The price in Rangoon is about Rs. 8, freight is Re. 1, and charges about 8 annas. There are said to be 150,000 bags in Rangoon awaiting-shipment and many are the struggles of shippers to get shipping orders Things will perhaps be better when the railway is open, but in the meantime there has been and will be a fine harvest for the steamers running the river. It is much to be regretted that some of your steamer companies did not come into work here last cold season. The Government contracts alone would have kept a company afloat for a long time."

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A CONTEMPORARY writes :—"The Forest School at Dehra opens for the annual course of study on the 1st July. It is said that several students who have passed out of Cooper's Hill are expected to join, in order to put them through a course of Indian Forestry. Would it not be better for Government, under these circumstances, as European Forestry is so entirely dissimillar to Oriental Forestry, to do away with Cooper's Hill altogether, and to increase the Dehra Doon Forest School, and put it on the status of a Forest College for the whole of India and Burmah?" This is exactly what we have been urging; but our contemporary of the *Indian Forester* has taken exception to the change suggested by us Before long, however, this will have to be done; and the sooner the better.

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WE note that at the meeting of the Linnean Society on April 21st, 1887, Mr. G. M. Holmes exhibited specimens of several species of *shorea* which yield vegetable fats in Borneo and Sumatra, and he directed attention to several species of *Dichopsis* affording guttapercha from the bark and fats from the seeds. He pointed out the importance of the cultivation of the more valuable *D. oblongifolia* and *Ceratophorus Leerii*, as the natives are rapidly destroying these trees, while it takes twenty years for them to arrive at productive maturity. The Dutch have already commenced their cultivation, and our planters in the colonies may hence take a lesson therefrom. There are, we believe, other varieties of shorea in this country besides the one (*shorea robusta*) that yields the valuable timber so well known, to cabinet makers.

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AT a recent meeting of the Nilghiri Natural History Society, Mr. Lawson read a paper on the "Genus Phœnix," or date palms of Southern India. The three species of these palms growing in the Madras Presidency were described, and their characters and habits pointed out in the plants shown at the meeting. Reference was made to the experiments in acclimatizing the Arabian date in India. Mr. Hooper showed *Naregamia alata*, the country ipecacuanha of the Portugese of Goa and the Western Coast. This drug is a reputed emetic, and its properties are being tried in Madras. Its active principle appears to reside in an alkaloid. A sample of the crystallized sulphate of this alkaloid was exhibited. Mr. Davison laid on the table a new species of Dixippus, named by Mr. Wood-Mason of Calcutta *D. Haplopes*. This insect is in great abundance, feeding upon the Cinchona leaves in Ossington Estate, Naduvatam.

*

THE total trade by land of British India with foreign countries for the ten months ended January 1887, amounted in value to Rs. 10,66,85,927, as compared with Rs. 9,92,39,739 in the corresponding period of the previous year. Of this total the value of exports was Rs 6,62,23,622, and that of imports Rs. 4,04,62,305; the former showing a satisfactory increase, and the latter a slight decrease over the figures of the previous year. The countries which show an increase in the value of imports are Khelat, Candahar, Sewestan, Cabool, Bajour, Kashmere, Thibet, Nepaul, and Hill Tipperah; while there is a decrease in the imports from Lus Beyla, transfrontier by rail, Ladak, Sikkim Upper Burmah, Kerenee, Zimme, and Siam. In the export trade Lus Beyla, Khelat, transfrontier by rail, Sewestan, Cabool, Tirah, Bajour, Kashmere, Nepaul, Sikkim, Upper Burmah, the North Shan States, and Zimme all show an increase, while Candahar, Ladak, Tibet, Manipore, Kerenee and Siam show a decrease.

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ONE of our London exchanges understands that there are fair grounds for expecting that an International Conference will be held in London for the purpose of settling the Sugar Bounty Question. Nothing is yet, so far as our present information goes, definitely settled. But should a conference assemble, we trust that a solution, by abolition of all drawbacks, rather than by attempts to correlate drawbacks and duties, will be aimed at. It must be remembered that the Select Committee on the British Sugar Industries in 1880, reported emphatically in favour of refining and manufacturing under excise supervision, as the most effectual method of securing the cessation of export bounties. Nothing has occurred since to detract from the value of this recommendation. The abolition of all drawbacks by levying the tax on sugar as delivered for home consumption is, in fact, the only satisfactory basis for an International Convention.

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WE learn that the recent rain has considerably improved the indigo prospects in Jessore, Krishnaghur, Moorshidabad and Midnapore, but in Purneah the crop has suffered from too much rain, while a large quantity of the plant on the low lands has been flooded. Manufacture has been commenced on a small scale at a few factories, but will not be generally till towards the end of the month. The rain has also much improved the prospects in Behar, and since the rainfall the whether has continued favourable. Manufacture has already commenced in Tirhoot and Champarun, and most factories were expected to be at work by the 15th instant. In the Benares District prospects are said to have much improved, but in other parts of the North-West Provinces rain is still wanted to enable the planters to complete their sowings and to bring on the young plant. Irrigation is, however, being largely resorted to. According to the Government returns the area of indigo land irrigated from the canals this year up to the 30th of April, was 101,778 acres, as against 57,375 acres at the same time last year.

MR. NEVILLE LUBBOCK has submitted a report upon the sugar exhibits at the 'Colinderies.' Referring to Indian sugars, he says :—"Approximate annual export : 50,000 tons. The samples exhibited, seven in all, were of a high class, but quite unsuited for this market. The loaf sugar, although by analysis but little inferior to the loaf sugar manufactured in this country, is entirely lacking in brilliancy, and has also the appearance to an uneducated eye of being far more inferior to the loaf to which we are accustomed than it is in reality. The British public attaches more importance to the appearance of sugar than to its intrinsic value. Hence the sugars most suitable to the English market are those which are most attractive in appearance. The same remarks apply to the white and grey granulated. The bulk of the sugar produced in India, and of that which comes from India to this country, is commonly known by the name of jaggery, but this description of sugar was not represented by any specimens." This is a hint that Indian sugar manufacturers should take to heart. The British public look only to 'appearances.'

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 16th June, 1887 :—Except in the Punjab, rain has been general throughout the country during the week under review. The falls were heaviest in Bombay, Bengal and Assam. *Kharif* ploughings and sowings are now in active progress in most parts of the country. In the Punjab more rain would be beneficial for ploughing operations. In Madras, Mysore and Coorg the outlook is favourable. Ploughing and sowing for the rainy-weather crops are going on in Bengal, and the crops above ground are generally doing well, though in the Northern Bengal districts some damage was caused by th

heavy rain at the end of May. Rice is being sown in Bombay, the Central Provinces, and Assam. In Burmah ploughing for the rice crop has commenced. Sugarcane promises well in Bengal, the North-West Provinces and Oudh, the Central Provinces, and Assam. Cholera is chiefly prevalent in the North-West Provinces and Oudh, and Bombay, and the mortality from the disease in two districts of the latter—Ahmednuggur and Sholapore—has been high. Elsewhere the public health is generally good. Prices show an upward tendency in the North-Western Provinces and Oudh, and are rising and high in three districts of the Punjab. Elsewhere they are fairly steady.

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The cactus, says our Chicago exchange, "which makes a wonderful growth in the semi-arid regions of the south-west, has been regarded as an absolute pest. But a correspondent of the *Rural World*, writing from La Salle Co., Texas, says he is having good success in making beef of it fed in connection with cotton seed. He runs it through a cutting machine of his own devising to get rid of the thorns and feeds it in troughs to his cattle at the rate of 60 pounds of the cut cactus mixed with 6 pounds of cotton seed meal per day. Ninety days of feeding made beef which he says so'd in Chicago at 4½ cent., while grass fed meat from the same locality sold for only 3½ cent. This is a big thing for the south-west if it is not a sell upon our c. e., which publishes it as *boná fide*. We had not supposed that this rank growth possessed nutritive properties of any value. The writer in this case says he has fed 400 beeves, and is now feeding 800 more. Taking his own statement, this number will require 24 tons of cactus per day. It must be pretty plentiful in that locality to hold out at this rate of consumption." This is a hint that might be taken advantage of in this country with much profit. The difficulty would be of course, in getting a machine to get rid of the spines. We throw out the suggestion for what it is worth.

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The action of ferrous oxide on vegetation was illustrated by Mr. J. S. Monro in his recent report on the influence of the ferrous oxide in basic cinder on the growth of plants. He describes experiments supplementary to those which formed the subject of a note some time since. Seeds of various sorts—Barley, white Turnips, Clover, white Mustard, garden Cress—were sown in mixtures of garden soil with basic cinder, in order to ascertain whether the large proportion of ferrous oxide in the basic cinder exercises any unfavourable influence on germination or growth. In order to put this question to the severest test, enormously exaggerated doses of basic cinder were employed, namely, 10 per cent. of the mixed soil, 25 per cent. to 50 per cent, and pure basic cinder without any soil. Most of the seeds tried germinated even in the pure basic cinder, and some of the plants lived until starved for want of nitrogenous food. All the other mixtures produced plants which flowered and seeded in due course—the Barley plants in the mixture of equal parts of basic cinder and garden soil were actually better than those grown in garden soil alone, and produced full ears of grain of unimpaired germinating power. Since basic cinder is an alkaline substance containing free lime, it is only natural that in the three strongest mixtures fewer seeds germinated than in the three weaker mixtures, or in garden soil alone. The conclusion arrived at is that the ferrous oxide contained in basic cinder is without injurious influence on germination or growth.

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A Ceylon contemporary informs us that the attempts to introduce the brook trout into that Island have proved a success. "The rivers of Ceylon seem peculiarly adapted to the requirements of brook trout, on account of their perennial streams, and there is every probability of the experiment proving successful. The ova were imported in two batches of 15,000 and out of one lot only 500 fry were obtained, whilst the other was more fortunate and produced as many as 7,000 of the young fish. Under the most favourable circumstances a large percentage of the ova of fish fail to hatch. Mr. Le Mesurier may, therefore, be congratulated upon having secured fish under the circumstances. The cost of the importation was £150, half of which sum Mr. Le Mesurier provided himself. The other half was subscribed by Ceylon gentlemen who are interested in the experiment. The ova, which resemble delicate pink peas, were packed with the greatest care, in alternate layers, between moss, and were protected with a covering of muslin, which prevented the eggs from escaping or being crushed. They were then placed on zinc trays, which were enclosed in a box. This box was put inside a larger box, and was surrounded by charcoal. Ice was kept constantly on the package, and the temperature was never allowed to rise above 40°. The hatching process was thus retarded or suspended during the journey. As soon as the ova arrived at Newara Eliya they were placed in hatching tanks, and immediately the little fish began to appear, all eyes and tail, and none the worse for their travels in the embryo state. When about two months old they were considered capable of beginning life on their own account, and little colonies have been turned down at Newara Eliya, and in the surrounding neighbourhood."

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A very full and satisfactory account of the beet sugar industry in California is given by Prof. E. W. Hilgard, in the September number of the *Overland Monthly*. From this account it appears that the working results of the beet sugar factory at Alvarado "have, for the past two years, been on a level with those of the best European factories." The principle points of peculiar adaptation of a certain portion of California to this industry are mentioned, the chief of these is the dry atmosphere by means of which the beets, after gathering, can be kept several months with little expense for protection. Another advantage is that "the absence of summer rains in ordinary seasons does away with a large portion of the expensive manual labour in hoeing and weeding, which forms a considerable item in the cost of production " in Europe and in the Atlantic States. It also appears that a higher sugar per centage is secured in the California beets than those employed in the best European factories. The conclusion is, that there is " abundant reason for the assertion that the beet sugar industry should be successful in California if anywhere, unless an unfriendly commercial policy on the part of the Government should interpose artificial obstacles." The Alvarado factory " has been exposed to adverse conditions to the fullest extent, in the most direct competition with the cheap product of plantation labour imported free of all duty from the Hawaiian Islands under the provisions of a so called reciprocity treaty, which while ostensibly reciprocal in principle, in practice works all one way." The writer estimates that Alameda and Santa Clara counties alone can yield an annual product of 760,000,000 pounds ; but other portions are well adapted to this industry, so that " California alone could readily supply the entire present and prospective sugar consumption of the United States and still leave ample room for orchard and vineyards and the production of the home supply of breadstuffs."

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We are indebted to our Lahore contemporary for the information that the Agricultural Department of the Punjab has made an attempt to introduce a new strain of cattle into the Upper Himalayas, in which region the cattle are poor, and all but milkless. The breeds of the lower hills or plains are useless for this part of the country, as they can neither stand the climate nor climb about the rocky precipices and mountain slopes, over which the native animals clamber like goats. Under these circumstances, the only hope of improvement seemed to lie in the introduction of some European breed, and the cattle from the mountains of Brittany have been chosen for the purpose. A good omen of success is found in the circumstance that the Brittany breed has been introduced with considerable success into the mountainous regions of Italy. A Brittany bull is a small, wiry, active, little animal, in every way suited in size and appearance for mating with the indigenous breed of the higher hills. The cow, small as she is, not much bigger than a calf of the plains' breed, gives six seers of milk. The Punjab Government has adopted the wise plan of distributing the cattle among planters and others who are likely to take special care of them, in Kumaon, the Kangra Valley, Simla and elsewhere, on the condition that a certain percentage of the young

stock shall be made available for future distribution. The natives of the hills have expressed an unbounded admiration for the pretty little animals, following them in crowds as they passed along the roads, and the European gentlemen to whom they have been consigned, evince a great interest in them ; one proud owner even building a special house with glass windows for the "Bilati gai" which were entrusted to his care. The cattle are apparently, from all accounts, as little fastidious as the indigenous hill animals, and eat heartily of grasses and shrubs that the plains' cattle will not touch ; their milk also is richer, while their offspring, after a few months old, are far larger and stronger than the hill calf eighteen months and even two years old. We shall await with considerable interest the result of this experiment.

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WE take the following notes from a report regarding Indian products at the late Indo-Colonial Exhibition :—

In the matter of hides, India is a long way ahead of the Colonies. In the course of the last five years, there were exported from this country 28,582,715 hides, known as "kips, and 721,622 ordinary hides of Bombay, Kurrachee, and Calcutta, buffaloes, the nearest approach to which is the importation from the Cape of 1,745,082 hides, salted and dry, and 88,791 kips and skins. With reference to sugar, we are informed that the world's production amounts to five million tons annually, in addition to what is made for home consumption in India, China and other tropical countries, about which nothing certain is known. Of these five millions, one-half is produced from sugar-cane and one-half from sugar beet, though the latter holds its place in the market only through the aid of Government subsidies. With regard to Indian coffee, the exhibits from Mysore, Coorg, and the Nilgherry districts are pronounced "remarkable for their high average excellence, and for the presence of many of the points which, in the eyes of connoisseurs, constitute the nearest approach to perfection, *viz*., size, colour, smoothness, plumpness, and weight of the berries." The teas chiefly in request at the Exhibition were the Darjeeling and Ceylon varieties. The total quantity of tea sold at the Exhibition was no more than 47,239 lbs. or 23,606 lbs. of Indian produce, 23,086 Ceylon, and 547 Natal. In addition to what was thus disposed of in packages, the consumption of Indian tea amounted to 5,784 lbs., or 347,040 cups ; of Ceylon tea to 6,055 lbs., or 363,300 cups, and of Natal tea to 344 lbs., or 20,640 cups. The tea industry was represented in the Exhibition by 1,374 specimens, mostly shown in glass vessels, *viz*., 684 from India, 624 from Ceylon, 37 from Natal, 16 from Fiji, 9 from Johore, and 4 from Jamaica. The use of machinery, instead of hand labour, as in China, is highly commended as greatly reducing the probability of contamination, and as tending to preserve the aromatic properties natural to the leaf.

THE question of the participation of Government in the cinchona industry has again been brought forward by the Madras Chamber of Commerce. We quoted last week a powerful article from the *Nilgiri Express* on this subject, in which our contemporary put the matter in a nut shell. We urged long ago that the only excuse the Government had for maintaining their extensive plantations, was their benevolent (?) object of finding a cheap and fit febrifuge for the fever-stricken people of India. But surely two millions of trees in southern India alone are not needed for the accomplishment of the object in view, especially when we consider that the net revenue from these two million trees amounted to nearly five lakhs of rupees! We suggested some time ago that these plantations should now be made over to private enterprise, save a small number of trees, sufficient to carry on the experiments upon which Mr. Hooper has been engaged for so many years. It is when the Government occupies the position of a *grower for the public market* that it comes into competition with private enterprise, and in this respect it is not the position, we think, that a great Government *should* occupy. It is time now that a change took place in this matter ; a change which we hope is not far distant if we are to accept what a contemporary states as a fact. "The Government of India it appears have called upon the Nilgiri authorities, to furnish information as to the acreage under cinchona cultivation on those hills, the number of plants standing on the land, and the estimated outturn obtained last year ; and the collector has accordingly asked owners of cinchona estates for these particulars. This information is said to be required for statistical purposes only, but statistics are always used or misused for some purpose, and if it is to relieve planters of the heavy land-tax they have to pay whether their estates yield or not, we heartily welcome this unexpected interest of the Government in an enterprise which has been the ruin of many." We trust sincerely it is not for 'statistical purposes' only that the information has been called for, but to consider the expediency of reducing the Government share in the cinchona industry as a profitable investment.

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A CORRESPONDENT of the *Times of India* writing about mangoes, says : "Whether the Mandalay mango is, as many stoutly maintain, equal to the Bombay mango, may be left an open question. That it should be even compared to the delicious fruit for which your city is famous shows, how good it must be. It certainly has an extremely delicate flavour, so delicate, indeed, as occasionally to baffle the taste altogether , but no one who knows what a really good Bombay mango is, will ever think the Madalay fruit to be compared to it. However, this being a free country every one is welcome to their own opinion, and, having just returned from a trip in the jungles round some outpost, I am able to bear witness without fear of contradiction to the immense superiority of the common mango as it grows in the jungles of Burmah, over the same variety of the fruit as it is found in India. Nothing can be more pleasant than when, after having ridden from day-break, you arrive at your destination about mid-day, and are received by the headman of the village with a good-will offering consisting of a basket of the best mangoes grown in the village. You have been riding at a foot-pace in order not to outstrip the baggage and escort, and the delightful sensation of getting off your little Burman pony, stretching your cramped legs, and then falling to at the basket of mangoes, is quite exquisite. The fruit itself is, for the most part, very like a jargonelle pear in shape, the skin being green or yellow with a tinge of pink. The flavour is very delicate, and the total absence of the taste of turpentine gives the jungle mango of Burmah an immense pull over his Indian brother. There is one particular kind of mango, the skin of which is very green, and the fruit itself inside is of a pale yellow and full of juice, while as to its exact flavour it is impossible to decide, until one has eaten at least a dozen, whether it reminds one most of a strawberry or an apricot, or both combined.' Mr. C. Maries, the great authority on Indian mangoes, might study this particular species of Mandalay mango.

THE INDIAN WHEAT TRADE.

(From the cultivator's point of view.)

IT is a curious fact that, while the wheat trade of this country has been discussed from the point of view of the Exporter, the buyer in Liverpool or London, and the middleman, no one has thought fit to put the matter before the public from the cultivator's point of view. This unfortunate individual has been painted as black as possible. He is described as a conservative of the most pronounced type, and quite callous to the wants of the trade, so long as he can eke out sufficient for a bare living. What are to him the demands of European countries in the matter of clean or unmixed grain ? What cares he for improved methods of cultivation, or the future deterioration of the land, so long as he can borrow from the mahajan a sum sufficient to raise a crop that will pay his debt to the latter, and leave him a small surplus to feed himself and his family upon The future to him is a blank. These are some of the characteristics of the ryot, at least, what we are accustomed to regard as true attributes of a class of people of whom little is known beyond the village where they dwell. And yet a closer study of the ryot and his surroundings elicits facts of which perhaps few outside the 'ring' are aware. Having had many opportunities of coming in contact with this 'unit' (for he is that from a statistical point of view), in his home, in the course of business, I shall here endeavour to give your readers some of the reasons why it has as yet been found impossible to

induce this 'unit' to take to scientific methods of cultivation in general, and of growing wheat in particular as a separate crop, and adopting precautions in threshing the grain so as to free it from dirt and mixture. Before proceeding any further, I should here state that my remarks refer to the system of carrying on the trade in wheat on the Bombay side; but I have scarcely any doubt that the practice is general throughout India—at any rate, I found it so in the North-Western Provinces and Oudh.

Some five years ago, having a little money which I was anxious to invest to the best advantage, I conceived the idea of becoming what you call a middleman; not in the sense of buying at a price ruinous to the ryot, and thereby enriching myself dishonestly at his expense, but in a fair way. I was told that it was the practice with the cultivators in the neighbourhood of Kutnee, on the G. I. P. Railway, (where I was stationed at the time) to farm out their crops, *i.e.*, to sell to the highest bidder their standing crops, when about a foot or so high, leaving it to the latter to harvest it, the ryot continuing to tend the fields as if the crops were his own property. Part of the money to be paid in advance, as earnest money, and the remainder when the harvest was completed. It will thus be seen that, although under these circumstances the purchaser would be a middleman, yet, he was the ryot *de facto*, having made himself responsible for the crop, whether good, bad, or indifferent. In this way I carried on business for some time. In the majority of cases I was a considerable gainer by the transaction, but occasionally I suffered heavy losses owing to unfavourable seasons. I thus had ample opportunities of coming in close contact with the ryots or cultivators.

It was a puzzle to me at first why these people took so little pains with their harvested crops in threshing the grain. But when I myself became a ryot, as it were, the reason was apparent enough. The agents of the large export firms in Bombay purchased the grain from *bona fide* middleman, who, having none but their own interests to serve, kept down the prices of wheat asked for by the ryot to the lowest limit, and to my certain knowledge, I rarely remember to have known a higher price than ten annas per maund to have been paid the ryot for his grain. The middleman usually sold his purchase to the Bombay firm's agent at about one rupee or one rupee and four annas per maund, while the same grain was selling at Bombay at something like three rupees per maund. It will thus be seen what an enormous profit was made on the origual price paid to the ryot. I sold my grain *direct* to the agent or to the *bunniah*, and so avoided the fleecing by the middleman proper, and having taken some pains to have the grain as clean as possile, got slightly higher prices for it.

Taking these circumstances into consideration, I would ask, Of what interest is it to the cultivator to take extra pains to clean his grain? "Why he would get higher prices for it to be sure!" you will exclaim. Not so, however. Suppose you offered the ryot two pice on every maund of wheat, if he undertook to supply you with clean grain. This would mean considerably more than the five per cent. deducted for impurities by the export firms. But the inducement is not sufficient: it would mean ten annas and six pies per maund, a price that would barely cover the cost of production, and allow a very small margin of profit. When you remember that most of these ryots cultivate no more then ten or twenty *bighas*, the ruinous nature of this price for the grain will be understood. How can you then expect a ryot to take extra pains to thresh his grain clean? It is not worth his while. Even I was disheartened, and gave up the business. The prices offered at the source of supply were ridiculously low, and not worth the trouble of taking extra pains to clean the grain.

As regards improved methods of cultivation, it is out of the question so far as the small cultivaters are concerned. The ryots have no incentive to adopt improved methods. I do not say that large landholders, or, more properly ryots who hold leases of large tracts of land, could not, or do not, apply these improved methods. Some of them do, as I know from personal experience. But it is a libel on the ryots generally to say that they are not sufficiently keen-sighted to know that these methods would improve the outturn of their crops; but as I have said before, there is no incentive; the inducement is not sufficient. The remedy lies with the purchasers of wheat. Let them send their agents to important centres, such as Kutnee, and instruct the latter to deal *direct* with the cultivators, offering them fair prices; and I have no doubt that a visible improvement in the condition of the grain would be the result.

I have read with some interest the article in your paper of the 18th instant, by a F. R. H. S., on this subject, which suggested this paper.

T. H. M.

THE COTTON INDUSTRY IN JAPAN.

Mr. G. H. Longford, the British Vice Consul at Tokyo, Japan, has submitted a most valuble report on the cotton industry in Japan, which should have a wide interest in India. The *Times of India* has reviewed the report at length, and we cannot do better than reproduce below what our contemporary has to say on the subject.—

One of the most interesting and valuable of the series of trade reports by her Majesty's representatives abroad, is one recently sent in by Vice-Consul Longford, of Tokyo, in regard to the native cotton manufactures of Japan. It is lucidly arranged, is exhaustive without being prolix, and contains many practical hints that merit earnest attention. The advice given is no doubt primarily intended for Lancashire, but as Bombay and Lancashire have precisely similar interests at stake, and are engaged in open and legitimate competition, it will be well for those engaged in the trade here to weigh carefully and lay to heart the lessons deduced from the past, and the hints thrown out for guidance in the future, that may be gleaned from Mr. Longford's able report. The document, though dealing specially with Japan, has something more than a circumscribed local importance, inasmuch as many of the facts contained therein may be generalised and applied to the cotton trade in all other Eastern markets. The story of the Japan cotton trade, as will be seen from what follows, contains much matter for congratulation and justifiable pride so far as Bombay is concerned. Manchester on the other hand can read it only with feelings of humiliation and regret, mingled with a consciousness that, after all, she is but reaping the fruits of her own sowing. The first point to be dealt with is how far Japan relies on her own cotton production and manufactures, and to what extent she resorts to imports from abroad. The cotton plant of Japan, it may be mentioned, has a short but fine staple, and is grown pretty well over the whole Empire. In another column we reproduce from Mr. Longford's report some highly interesting details regarding the Japanese method of cultivation, as also the native methods of ginning, carding, spinning, and weaving. The average annual crop of cotton in Japan, based on the returns of the seven years ending 1884, is 131,000,000lbs. weight. After allowing for the loss in ginning and carding (about two-thirds), there remain about 44,000,000 lbs., which figures represent the amount of cotton wool annually obtained by native production. The

the statistics of the same period of seven years, is 3,000,000 lbs, —an import by the way on which it is to be noted the returns of the year 1885 show a very large increase. Making an allowance for loss in carding, the entire annual supply of cotton wool in Japan may be set down as between 46,000,000 and 47,000,000 lbs. Of this total Mr. Longford, from careful inquiries, estimates that three-tenths are utilised for stuffing purposes, and the remaining seven-tenths for spinning into yarn. Of this seven-tenths, one-seventh is used for sewing, embroidery, and the remaining six sevenths are woven into cloth. As cotton wool loses scarcely any of its weight in spinning, we thus arrive at the calculation that about 28,000,000lbs. of native-made yarn are annually woven into cotton cloth in Japan.

Turning now to imports, we have to consider first cotton yarn, and then cotton piece-goods. The import of cotton yarn from England and Bombay is now, Mr Longford tells us, so large that this staple is considered by English merchants in Yokohama as the principal item in the British trade with Japan. In 1885 it represented nearly one-third of the entire value of British imports, including those from India. Taking the same seven years for which the figures as to native production are available, we find that the average annual import of yarn into Japan is 34,000,000lbs. Adding to this the amount of the native yarn, we have the total average supply of cotton yarn in Japan for weaving into cloth as being 62,000,000lbs. The most important point to be noted is that

Japan is yearly obtaining less and less of its foreign yarns from England, and more from Bombay. The subjoined table shows at a glance the great change that has been brought about in the space of six years :—

Years.	Import of Cotton Yarn from England.	Inport of Cotton Yarn from Bombay.
	lbs.	lbs.
1880 ...	33,746,000	4,363,000
1881 ...	29,407,000	7,173,000
1882 ...	24,683,000	8,717,000
1883 ...	22,275,000	10,579,000
1884 ...	19,516,000	8,718,000
1885 ...	16,174,000	12,355,000

In regard to the native manufacture of cotton, a full account of which we give in another column in Mr. Longford's own words, it is unnecessary here to write in detail. We would draw attention, however, to the following striking facts, namely, that by the native processes a day's work (ten hours) at ginning gives only a little over three lbs. of ginned cotton, a worker engaged in carding can in a day only deal with about 10 to 20 lbs. weight of raw cotton, and in spinning only about 1 lb. of yarn can be turned out in a day. In spinning, however, the Japanese are having recourse largely to English methods, there being now in the country no fewer than twenty-one spinning factories worked by foreign machinery. But weaving is still purely a domestic industry, being carried on by the old-fashined hand-loom. Now, to come to the crux of the whole question, it is an undoubted fact, extraordinary as it may appear—and scandalous also, as will be shown—that the native hand-loom weaver competes successfully with, and, indeed, beats the Lancashire manufacturer! The result is that, during recent years, the import of cotton piece-goods from England has fallen heavily and steadily both in amount and in value. In 1879 the number of yards imported was 97,163,000, of the value of £1,195,000; in 1884 the figures had fallen to 43,362,000 yards, of a value of £506,000.

The cause for this remarkable and lamentable decline lies beyond all possibility of doubt in the bad quality of the English cotton piece-goods now imported for sale to the Japanese. English shirtings imported in 1860 were in wearing capacity quite equal to anything produced by hand work in Japan, and were at the same time superior in appearance. They were entirely free from sizing, stood all rough usage, and accordingly came rapidly to the front, meeting with a ready sale at high prices. As Mr. Longford writes, "the very name of English shirtings was then synonymous with good quality, and good money's worth." Now all is changed. Of late years quality and durability have been sacrificed for appearance and cheapness. The English shirtings now sent to Japan are loaded with size, they tear rapidly, they will not stand a single washing; when died their colours run together and soon entirely fade, and after being worn a short time as linings—almost the sole "base use" they are now put to in Japan—they are even found to be worthless for household purposes when torn up into dusters, washing clothes, wrappers, &c. The Japanese "moka", on the other hand, the correlative of the imported shirtings, is described as wearing for years and years and standing washing without tearing or shrinking, garments made from it being often actually handed down from father to son. Needless to say, after a few years' experience of the attractive-looking but useless English article imported of recent years, the Japanese now turn away from it with disgust, and have returned to the old native hand-loom woven cotton. Thus, after all, as we have before remarked, it may be truly said that Manchester is only reaping the fruits of her own sewing. The moral is sufficiently obvious. If the English cotton manufacturer is to regain his position in Japan and extend his trade in that country—the field is truly an immense one, almost every person in a population of 37,000,000 using cotton piece-goods in some form or another—he must return to the principle of only supplying a thoroughly good and durable article. The sacrifice of all considerations to that of mere cheapness can, in the end, lead to but one result—the trade will go to other hands. But the lesson is not for Manchester alone or for the cotton industry alone. It is for the whole Empire and for all the departments of trade to take it to heart, and be warned in time *not* to go and do likewise.

According to an enthusiastic Bordeaux paper, the cinchonas grown in the French island of "La Reunion," near Madagascar, are likely at last to yield their first appreciable crop of bark. No estimates of the probable yield are given, but it does not seem to be likely to materially affect the price of quinine.

THE INDIAN WHEAT CROP, 1886-87.

We are indebted to the Government of India in the Revenue and Agricultural Department, for the following final general memorandum on the wheat crop of the season 1886-87 :—

The third and final report on the condition and prospects of the wheat harvest of 1886-87, which has now been completed in all parts of the country, have been received from the Provincial Governments. Estimates have been supplied of the area and outturn in the Punjab, the North Western Provinces and Oudh, the Central Provinces, Bombay and Berar, which taken together comprise in ordinary years nearly three quarters of the toal area of wheat cultivation in India. For the remaining one-fourth, which is contained in Bengal and in the Native States of the Rajpootana and Central India Agencies, Mysore and Kashmere, the figures, except in the case of Bengal, are less trustworthy, owing to the absence of any organised agency for testing area or outturn. For Bengal a special report has for the first time been submitted this year, and the estimates are on the whole believed to be fairly reliable. The normal area under wheat in India is believed to be about 26,000,000 acres, of which the average outturn is estimated roughly at 7,135,000 tons. Details of the former estimate are given below :—

	Acres.
Punjab	7,000,000
North-Western Provinces and Oudh ...	5,037,000
Central Provinces	4,000,000
Bombay (including Baroda)	1,883,000
Berar	807,000
Bengal (Behar)	1,134,900
Rajpootana	2,500,000
Central India	2,500,000
Hyderabad	750,000
Mysore	20,000
Kashmere	500,000

The whole area cultivated in the year 1886-87 is estimated to have been approximately 26,735,484 acres, with an yield of about 6,390,695 tons. (This gives an average yield of about 10 bushels of 50lbs. each per acre —Ed., *I. A.*)

The following table compares the actual area and outturn of the provinces enumerated, with the area and outturn of avearge years :—

Province.	Supposed normal area.	Area ascertained up to end of April 1887.	Estimated outturn of area in column 3.
	Acres.	Acres.	Tons.
Punjab	7,000,000	5,943,400	1,361,915
North-Western Provinces and Oudh ...	5,037,000	4,962,942	1,732,050
Central Provinces ...	4,000,000	4,297,949	860,000
Bombay (including Baroda) ...	1,883,000*	2,860,454†	801,400†
Berar	807,000	933,938	133,419
Total ...	18,727,000	18,998,683	4,888,784

* Inclusive of Baroda, but exclusive of the other Native States under the political control of the Government of Bombay.

† Inclusive of area and outturn for Native States (besides Baroda) under the political control of the Government of Bombay, amounting to an estimated area of 608,254 acres and estimated yield of 186,000 tons.

The following table shows the latest estimates of the area and outturn for Bengal and the Native States. The figures for Central India and Kashmere are identical with those given last year, no revised figures being available. In all cases the figures represent merely rough estimates :—

Provinces.	Supposed normal area.	Estmtd. area of 1886-87	Estmtd. outturn of 1886-87.
	Acres.	Acres.	Tons.
Bengal (Behar) ...	1,134,900	1,009,335	400,000
Rajpootana	2,500,000	1,562,309	397,769
Central India	2,500,000	3,500,000	500,000
Hyderabad	750,000	1,156,229	69,565
Mysore	20,000	8,928	1,244
Kashmere	500,000	500,000	133,333
Total ...	7,404,900	7,736,801	1,501,911

The final reports give the following particulars regarding the wheat crop. In the Central Provinces, the wheat has turned out rather worse than was anticipated in the north of the provinces, where the damage done by frost was more extensive than had been believed, and rather better than was anticipated in the Nagpore country. In Berar the crop suffered from want of moisture owing to the shortness of the ordinary monsoon rainfall, while in some places the severe and exceptional cold which followed the winter rains induced an attack of rust which did considerable damage. In the North-Western Provinces and Oudh the weather towards the close of January and beginning of February was abnormally cold, with the result that serious damage was caused by frost to the wheat crop as well as to other food grains. In the Punjab much damage was caused to the crop by the failure of the winter rains and by frost and dry winds. The grain harvested is, however, reported to be in excellent condition. In Bombay the crop was a good deal affected generally throughout the presidency by frost and rust brought on by the excessive cold. In Bengal excessive rain during September and October made it impossible to prepare land for wheat in due time, and the crop moreover suffered from rust brought on by heavy rains in January.

As regards other food grains and non edible crops the following information is furnished :—In the North-Western Provinces and Oudh the crops of food grains have been inferior to those of the previous year, hence there exists a greater demand for wheat for local consumption. In Bombay the *bajri* (spiked millet) and *jowari* (great millet) crops which constitute the important food staples of the people, have generally yielded well. In Behar also a very fair crop of *jowari* (great millet), the staple food crop of the province was gathered.

The following table compiled from the annual trade report shows the exports of wheat from India for the past six years :—

	Tons.
1881 82	99[illegible]176
1882-83	707,[illegible]20
1883-84	1,047,[illegible]4
1884-85	792,7[illegible]4
1885 86	1,053,0[illegible]
1886-87	1,113,16[illegible]

The following table shows the share of each port in the total quantity of wheat exported during the last four years :—

Ports.		1883 84	1884-85	1885 86	1886-87
		Tons.	Tons.	Tons.	Tons.
Calcutta	...	380,586	128,160	209,483	[illegible]51,898
Bombay	...	448,580	449,655	530,434	[illegible]30,307
Karachi	...	218,642	214 719	312,051	[illegible]30,689
Madras	...	76	65	93	49
Rangoon	...	...	115	964	224
Total	..	1,047,824	792,714	1,053,025	1,1[illegible]3,167

The following table shows the countries to which the wheat was exported :—

Countries.		1883 84.	1884 85.	1885 86.	
		Tons.	Tons.	Tons.	
United Kingdom	...	525,413	372,249	603,561	
Italy ...	...	22,273	35,045	60,913	
France ...	...	169 895	165,748	107 262	
Belgium ...	...	129,678	86,934	133,079	
Egypt ...	...	165,299	110,575	114,807	
Holland ...	...	9,637	4,6[illegible]7	4,296	
Other countries	...	25,626	17,536	29,107	
Total	...	1,047,824	792,714	1,053,025	1,113,1[illegible]

THE Lima bean is a native of tropical South America, Asia and Africa In those countries it grows vigorously and is perennial with seeds thin, of remarkable size and excellence In the Southern States it retains these characteristics. Transplanted to this climate the vegetable adapts itself to its new situation, but undergoes deliberate changes ; in the North it becomes an annual, and able to produce in its short season as greatly as during the long season of its nativity The seed of northern production is not so large as the original one and much thicker ; the pod is more fibrous, the outer skin thicker ; the particles of albumen, starch and sugar of which the seed is composed, are finer and more nearly solid. The germ requires greater protection from cold and this is given it ; the plant loses delicacy without parting with its richness, but for this deficiency it compensates by great productiveness.

Miscellaneous Items.

THE ostrich feathers which were sold during the month of March, at Port Elizabeth in South Africa, realised £26,245. The small ostrich experimental farm at Delhi should feel encouraged.

THE opium revenue from three sales of Bengal opium and two months' pass duty on opium exported from Bombay, has amounted to Rs. 1, 77,05,950, which is Rs. 15, 35, 850 less than the estimate, Of this latter sum, Bengal opium contributed Rs. 3,29,200, and Bombay opium Rs. 12,06,650,

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season this year to the 19th of May, was 1,933, 992lbs, as compared with 2,845,366lbs. exported in the corresponding period of last season. The exports to the United States and Canada were 4,439lbs,, as against 28,702lbs.

A CHINA paper states that there is some probability that before long the tea transit trade for Central Asia, Siberia, and Russia, from China, will be diverted to one or both of two new routes, the first of which is by Vladivostock to the Ussiri, Amur Barkal to Irkutsk; and the second, by Nicoloswisk, *via* the Amur and Shilka, to Bairkal and Irkutsk.

COTTON we are told, is not a fibre, but a plant hair. It holds to be spun into a thread because of peculiar twists in each hair, shown under the microscope, especially in polarized light. Linen thread may be spun because the flax fibres have certain roughness on their surfaces, which enable them to cling together. Hence it is impossible to make as fine linen as cotton cloth, but it is much stronger.

LAST year the Government of Victoria voted a considerable sum of money in aid of prospecting for quartz reefs and alluvial leads of gold. This at once caused a vigorous search in the auriferous districts of the colony, and several discoveries were made and duly reported to the Mines Department. On investigation, however, it turned out that none of these discoveries were likely to prove of any great importance.

THE latest use to which electricity has been put is, to hatch eggs. The " Patent Electrical Mother" is the invention of a Russian, and is said to be greatly superior to other forms of incubators for the hatching of eggs by artificial heat. The warmth generated by it is stated to be more regular and constant, and it has the advantage of being applicable to many other purposes where a uniform temperature is required for any lengthy period.

THE improved French method of preserving wood by the application of lime, says a contemporary, is found to work well. The plan is to pile the planks in a tank, and to put over all a layer of quicklime, which is gradually slaked with water. Timber for mines requires about a week to be thoroughly impregnated, and other wood, more or less time according to its thickness. The material acquires remarkable consistence and hardness, it is stated, on being subjected to this simple process, and the assertion is made that it will never rot. Beech wood prepared in this way for hammers and others tools for iron works, is found to acquire the hardness of oak without parting with any of its well-known elasticity and toughness, and it also lasts longer.

A FRENCH physician has been giving some counsels to smokers. He has found that the disease most frequently induced by smoking is fatty degeneration of the heart, but he is a smoker himself and does not advise his patients to forswear long habit. That he thinks would cause their last state to be worse than their first. Instead of doing this he lays down a code of rules for the guidance of smokers to which it is to be feared they will not pay as much attention as they might Never smoke fasting says the doctor. It has hitherto been supposed that smoking was an excellent antidote to hunger, and many a traveller has certainly found it to be so. A pipe a tightening of the belt, and a nip of brandy is Mr Archibald Forbes' recipe for staying a craving stomach. Do not keep a cigar too long in the mouth and do not habitually smoke strong Partagas—are excellent counsels which a great number of people already follow for a variety of reasons. The doctor's final advice is that cigarholders should be frequently cleaned But surely the enlightened and instructed smoker would as soon think of cutting off his cigars altogether as of smoking them through the medium of a holder. There is something to be said for smoking cigarettes through a holder ; but cigars !

Brigade Surgeon R. E. Pearse, the Principal Medical Storekeeper, Madras, has we learn, says a local paper, been congratulated by Government on the successful result of his experiment of locally manufacturing *spiritus either nitrosi*—an experiment which has not hitherto been tried in Madras: The Director-General of Stores in the India Office at first suggested the desirability of its manufacture here, seeing the very high charges paid for it in England. Dr. Pearse has manufactured it at a cost less than it could be procured from England, and of unexceptionable quality. This is but a pioneer effort, and we trust that other drugs might similarly be manufactured in Madras, with advantage to the State, to which end we would suggest that a manufacturing chemist be got out from England by Government and attached to the store depot.

A great many theories have been propounded in explanation of the mode of formation of ozone in the atmosphere, the latest of which is that of C. Wurster, whose observations have led him to conclude that it is formed by the action of sunlight on clouds. He states that when clouds are continually formed from above they become highly charged with this active form of oxygen, whilst those formed from below only contain it in notable quantity in their upper layer. This theory has one advantage over many others, it admits of confirmation or refutation, both by observation and experiment. Artificial clouds are easily formed, may be confined in glass vessels, and there exposed to sunlight. Ordinary ozonometer paper contained in the same vessel will at once display the formation of ozone if it actually occurs.

Selections.

THE COTTON INDUSTRY IN JAPAN.

The following extracts, referred to in our leading columns, are from a report on the native cotton manufactures of Japan, presented to the Foreign Office by Mr. Joseph H. Longford, our Vice-Consul at Tokyo :—

NATIVE METHOD OF CULTIVATION.

There are now many varieties of the original species, and the cultivation of the plant varies somewhat in its details in different localities. The variations are, however, mostly in dates, and the general guiding principles of the several operations are nearly the same throughout the whole country. The system, which I will now describe, is that followed in the prefectures of Shidzuoka and Aichi, both situated on the east coast, somewhat south of the capital, and the latter of which is one of the largest cotton-producing districts in the country

The land best suited for cotton growing is one of a sandy soil, the admixture of earth and sand being in the proportion of two parts earth to one of sand. During the winter and spring months crops of wheat or barley are raised on it, and it is when these corps have attained their full height during the month of May that the cotton is sown. About 50 days prior to the sowing, a manure is prepared consisting of chopped straw, straw ashes, green grass, rice-bran and earth from the bottom of stagnant pools. These ingredients are all carefully mixed together in equal proportions and the manure thus made which is most essential, is then allowed to stand till requred for use. Ten days before the time fixed for sowing, narrow trenches about one inch in depth are dug in the furrows between the rows of standing wheat or barley and the manure is liberally sprinkled along them by hand.

For one night before sowing, the seed is steeped in water. It is then taken out slightly mixed with straw ashes and sown in the trenches at intervals of a few inches. When sown it is covered with earth to the depth of half an inch, and gently trampled down by foot. Four or five days after sowing, the buds begin to appear above the earth and almost simultaneously the wheat or barley between which they grow, is ripe for the sickle. While the latter is being harvested, the cotton can be left to itself, but not for too long. The buds appear in much larger numbers than the soil could support if they were allowed to grow ; they have accordingly to be carefully thinned out so that not more than five or six plants are left in each foot of length. The next process is the sprinkling of a manure composed of one part night soil and three parts water, and again, subsequent to this, there are two further manurings : one of a mixture of dried sardines, lees of oil, and lees of rice beer, which is applied about the middle of June when it attained a height of four inches ; and again, early in July, when the plant has grown to a height of six or seven inches, a further one of night-soil mixed with a larger portion of water than before,

At this stage the head of the plant is pinched off with the fingers in order to check the excessive growth of the stem and direct the strength into the branches, which usually number five or six. From these branches minor ones spring, but the latter must be carefully pruned off as they appear, otherwise the full growth of the pod will be greatly impeded. Secondary plants that appear above the ground from the seeds originally sown together must be removed with equal speed and carefulness. In the middle of August the flowers begin to appear gradually. They fall soon after their appearance, leaving in their place the pod or "peach" (momo) which, after ripening, opens in October by three or four valves and exposes the cotton, to view. From the first appearance of the cotton four days are required for the full opening of the pods, and then the cotton is found in the spaces between each valve. From this time the field must be constantly and carefully watched, and each plant is to be picked the moment it appears fit. The cotton is gathered in baskets, in which it is allowed to remain till a bright sunshiny day comes, when it is spread out on mats to dry and swell in the sun for two or three days. If the watching be neglected, and the picking unreasonably delayed in consequence, the cotton falls off of itself. This fallen cotton may be taken up and dried in the same way as that properly picked, when any earth that may have adhered to it hardens, and can be easily rubbed off by rolling the cotton in the palms of the hands. This process is, however, laborious, and the cotton is inferior to that which has been properly picked in due time. After drying the cotton may be packed in bags made of straw matting, and either sold or, what is the more usual course, put aside until such time as the farmer's leisure from other agricultural operations enables him to deal with it.

The average yield of cotton in good districts in Japan is about 120 lbs. to the acre, but, as has been shown, cotton is only a secondary crop, and it does not, therefore, represent the whole profit gained by the farmer from his land : otherwise his gain would be small, as the average market price of unginned cotton in the two prefectures to which the above description applies was, in the year 1883, only a little over 2*d*. sterling per pound, and in the following year about 3*d* per pound, and, even on these, the prices now prevailing exhibit a considerable decrease.

MANUFACTURE OF COTTON.

The manufacture of cotton in Japan is still in all its stages largely a domestic one : in some it may be said to be entirely so, conducted with the most primitive implements, and without the smallest attempt at any logical or economical division of labours. Gin, spindle and loom are all found in the house of the farmer on whose land the cotton was originally grown, and not only what is required for the wants of his own family is spun and woven by the female members thereof but a surplus is also produced for sale ; throughout the entire country, wherever cotton is grown, and in many districts also where it is not, scarcely a single hamlet can be seen where wheel or loom, or both are not at work in many houses, and it is from the results of labour, carried on by peasant women in this manner, that by far the greater portion of Japanese cotton yarn and cotton piece-goods are produced. Several spinning factories with imported English machinery have been established during the course of the last 20 years. I only know of one similar cotton weaving factory and that has not been a successful experiment. Other so-called weaving factories throughout the country consist only of a collection of the ordinary hand-looms to the number of 30, 40, or 50, scarcely ever reaching over 100, in one building or shed, wherein individual manufacturers have their own special piece-goods ...e. Factories, even such as the latter, are, however, only to be ... in the principal cities or prefectural capitals ; elsewhere weaving is as purely domestic as is the general spinning.

Ginning.

The first operation in the manufacture is that of "ginning," which is conducted by means of a small implement called the "rokuro," or windlass. This consists of two small wooden rollers, revolving in opposite directions, fixed in a frame about 12 inches high and six in width, standing on a small platform, the dimensions of which slightly exceed that of the frame. The operator, usually, a woman, kneels on the near side of the frame, holding it firm by her weight, works the rollers with one hand and with the other presses the cotton, which she takes from a heap at her side, between the rollers. The cotton passes through, falling in small lumps on the off side of the frame, while the seeds fall on that nearest the woman. The process is not only laborious, but extremely slow. The utmost weight of unginned cotton that one woman, working an entire day of, say, 10 hours, can gin is from eight to ten lbs. which gives, in the end, only a little over three lbs. weight of ginned cot-

ton, and her daily earnings amount to less than 2d. A few saw gins have been introduced into Japan during the last 15 years, but no effort has been made to secure their distribution throughout the country districts, or teach the people at large their economy and other advantages, and it seems probable that the antiquated implement above described will continue to be largely used as at present, until such time as the co-operation of foreign capital and intelligent supervision of labour with native industry may bring about a much-needed reform in this as in other branches of the cotton manufacture. After ginning a certain proportion of the seed is reserved for the agricultural requirements of the following year. The balance is sent to oil factories, where it is pressed, and yields about one-eighth of its capacity in measurement in oil, the refuse, after pressing being used for manure.

CARDING.

The ginning having been finished in the country districts, the raw cotton may either be packed in bales and sent to the dealers in the cities, or else the next process, that of carding, may be at once proceeded with on the spot. This process is almost as primitive as that of the ginning. A long bamboo, sufficiently thin to be flexible, is fastened at its base to a pillar, or the corner of a small room. It slopes upwards ito the centre of the room, and from its upper end a hempen cord is suspended. To this is fastened the "bow," an instrument made of oak, about five feet in length, two inches in circumference, and shaped much as a ladle. A string of coarse catgut is tightly stretched from end to end of the bow, and this is beaten with a small mallet made of willow, bound at the end with a ring of iron or brass. The raw cotton in its coarse state is piled on the floor just underneath the string of the bow. The string it; catches is then rapidly beaten with the mallet, and as it rises and falls it catches rough cotton, cuts it to the required degree of fineness removes impurities from it, and flings it to the off side of the operator, where it falls on a hempen net stretched over a four-cornered wooden frame. The spaces of the net are about one-quarter of an inch square, and through these any particles of dust that may still have adhered to the cotton fall to the floor, leaving piled on top of the net the pure cotton wool in its finished state.

This work is always performed by a man, and by assiduous toil throughout a long day, one man can card from 10 to 20 lbs, weight of raw cotton. Payment is made in proportion to the work done, and in the less remote country districts is at the rate of about 1d. for each lb carded The operation is however performed quite as largely in the town as in the country. There is scarcely a single bye-street in Tokyo, in which may not be found a dealer in cotton wool, and a passer who at any hour of the day, takes his stand and listens for a few moments outside one of these shops, may hear from the upper storey or from the rear of the house the ceaseless twanging of the bows, and if he enters and looks round will find the process just described in full swing. In the town, the workmen naturally receive higher wages than in the country; they are said to be more skilled, and able to get through a greater amount of work, but it would be an altogether excessive estimate to say that they are able, as an average to card 20lbs of raw cotton per di[illegible]

SPINNING AND WEAVING

In the first of these branches of the cotton manufacture the Japanese have largely had recourse to the aid of foreign machinery, but it still to a much greater extent a domestic one, or at best carried on like weaving, in the establishments of cotton traders in which a number of workers, varying from 20 to 100 or more, each with her own spinning wheel, are collected together

It would be useless to give a detailed description of this spinning wheel. It differs in no respect from that used in Japan 300 years ago, or, except that bamboo forms an integral part of the materials of which it is made, from that used in England prior to the invention of the jenny. The cost of one of the wheels shown in the illustration is about 9d; it will last for five or six years; with it a woman of ordinary skill can spin about 1 lb. of yarn in a day of 10 hours, earning thereby about 2d. Women and girls of every age are employed on it, and in one trader's establishment, which I visited I saw among the workers several children of seven or eight years of age and one venerable dame whose age was stated to over 90.

MACHINE SPINNING

There are at present in various parts of Japan in all 21 spinning factories worked by foreign machinery. Of four of these there is no information, but of the remainder one has 120 spindles, eleven 2,000 spindles, two 3,000 two 4,000 and one 18.000 spindles The last mentioned is the Osaka spinning factory, established and entirely owned by a private company; a majority of the others were originally either assisted or entirely established by the Government.

In the monthly reports of the Department of Agriculture and Commerce statistics concerning these factories are usually given. According to the report for the month of September last, nine factories were working both night and day, for an average of 26 days in the month; from four factories there were no returns, while the balance varied between 12 and 18 hours per diem for nearly a similar average of days. The machinery in all cases, has been obtained from England, but in only nine it is driven by steam.

The Osaka factory has from a financial point of view been a brilliant success the dividend paid on the subscribed capital being at the rate of 16 per cent. A large increase to it is now about to be made and I believe the order for the necessary machinery has already been sent to England. Encouraged by its example projects for other similar factories on an equally large scale are now being freely mooted and many Japanese cotton traders speak ambitiously of not only being able to supply all their own wants in respect of cotton yarn but also to gain to a considerable extent, the market of China which lies at their very doors. Certainly the present native grown supply of raw cotton is utterly insufficient to meet Japan's own wants not to speak at all of a surplus for export; but even if there is no increased cultivation of cotton in Japan abundance of it can be had at little cost from the fertile regions of Southern China, where it can be procured in almost inexhaustible quantities; and once western appliances for its manufacture are freely used throughout the country, there is no reason why the Chinese grown cotton could not be profitably re exported as yarn from Japan

Judging from the accounts published in the native press of the readiness with which funds are now being provided by private investors for various industrial undertakings, it would seem as if there is no lack of capital in the hands of the people; there is now a fair supply of skilled spinners to act as instructors, and both cheap and intelligent labour can be had to any extent that may be necessary. Strikes or other combinations of working classes adverse to the interests of their employers are practically unknown and land and cost of building are both cheap. With these facts before them, Japanese traders my well be justified in entertaining their present roseate views of the possible future of this industry, and English spinners should, on the other hand, look forward to the time when they may find in Japan a strong competitor for the Chinese market

Only one of the factories already in existence is in the neighbourhood of Tokyo, and that is the smallest of all, possessing only 120 spindles. It was, however, among the first established, having been erected about 17 years ago. In the commencement of its career it met with many discouraging difficulties. No one knew how to work it, and in their ignorance the proprietors engaged foreign instructors, who were found to be thoroughly incompetent. These difficulties have, however, been overcome; the mill now works night and day, and the proprietor could find ample occupation for it were it double its present size. As it is, he can only accept orders to be put in hand about three months subsequent to the date of their receipt, and the contour of the ground on which it is built prevents any extension of the factory.

The machinery consists of one lap or scutching machine, two carding and drawing machines, three rovers, five ring-frames with 144 spindles each, and one double reel, the whole driven by a water-wheel working up to 15 horse power. There are two relays of workers, working alternately night and day, all of whom are lodged and fed entirely on the premises The daily wages paid (including estimated value of board and lodging) are:—

Man in charge of scutching machine, 1s, ½d; woman at carding and drawing machines 10d; at rovers, 10d.: at ring frames (one woman or two apprentices to each frame) 7d; at double reel (one woman on each side), 7d; two forewomen, each 1s. A small gratuity is made at certain periods out of the profits to each worker, all of whom look upon the interests of their employers as being also their own, and in consequence, can be relied upon to perform their respective shares of work to the very best of their abilities,

JAPANESE YARN SPUN BY MACHINERY.

The yarn spun "on the reverse," that being much better suited to Japanese requirements than the ordinary English yarn; it varies from No. 10 to No. 20, but the sizes most in demand are from Nos. 12 to 16, and its average selling price is about 4 lb. per picul (133lbs.). Quotations in Yokohama for English cotton yarn, Nos. 16 to 24 reverse, are about 5l for the same quantity, and if the selling price above stated is correct, it would seem that the yarn most desired by the Japanese can be produced by the aid of foreign machinery more cheaply than it can be imported from England— a fact which,

combined with the increased development of factories of this description in Japan, affords but an unpromising outlook for the English trade in this staple.

WEAVING.

It has been already stated in this report that there is only one cotton weaving factory in Japan worked by foreign machinery, and that, I believe, is at the present moment standing idle. Apart from that single factory, almost the entire cotton weaving industry in Japan is carried on by means of the old fashioned hand-loom.

In a few places I have seen a slight improvement on this, by which the weaver's hand in the operation of throwing the shuttle has been replaced by a simple but effective mechanical arrangement the original idea of which was evidently obtained from foreign machinery. A small pulley is suspended from the upper rod of the frame, and a string passing over the pulley is united with two other strings fastened at their other ends to shuttle racers on the shed, at each side of the loom. The weaver in this case has in addition to working the reed only to pull the string over the pulley when the shuttle is shot backwards and forwards with great rapidity. I should state however that I have only seen this improvement in operation on looms much wider than the generality which were used for weaving cotton cloth not of the usual Japanese dimensions, but of the width that rendred it suitable for being made up into European clothing.

WAGES OF HAND WEAVERS.

In the country districts where several looms are collected together in the establishment of one manufacturer the wages usually paid to weavers for a working day of 10 hours may be stated at an average of 6d. without board and lodging, and two days are usually reckoned as the time necessary for weaving the piece of cloth a little over 34 feet in length. In the district however in which I obtained this information, only the better and more durable classes of cloth were woven. In the cheaper qualities the cost of weaving is considerably under that just stated and in the more remote country districts throughout the interior the scale of wages is also much lower.

COCONUT TISSUE AND FIBRE.

(*Straits Times*, March 21st.)

A PRODUCTIVE of French origin is now beginning to attract attention in Europe. Several years ago a French naval officer, Palla dela Barriere by name took note of the very remarkable compressible properties of the cellular tissue underlying the bark of the coconut tree. From this substance he has prepared a material passing by the name of cofferdam. The cellular tissue in question has the peculiar property of closely compressing itself, and then again expanding to the fullest extent after a projectile had gone through it, by closing up the hole and thereby preventing the water from forcing its way within through the opening. It acts as an automatic stop per. The discovery is of importance. The subjoined particulars show that it has been quite unexpectedly found to be serviceable in another direction than that of war. We may here state that Miss Wood has discovered a stopping material still more approaching perfection than coconut tissue, as regards its compressible quality. Woodite, as this material is called, strongly resembles vulcanised caoutchouc. Experiments have been made in Britain with discs lined with woodite and exposed to fire from Nordenfeldt machine guns, at right angles and under an angle of 45 degrees. The woodite facing and the iron discs were literally strewn with projectiles. After the experiments when the discs were examined not a hole was to be seen. A few discoloured spots only showed the places where the projectiles had impacted. No dents were noticeable. The closing up was perfect. Miss Wood had sought for this material with the object of protecting torpedo boats, the hulls of which are so light and so easily damaged by the smallest projectile M. Germain, a young French chemist, has hit upon the idea of turning the fibres of the coconut to account in solving quite another question. It is well known that very generally electric batteries are at present coming into use, for house bells and telephones, for military requirements, and for naval purposes. These batteries contain fluid substances which might spill or leak. Now, an empty battery is utterly worthless for the end in view. Moreover, these fluids, however carefully compounded, are liable to give rise to stains and burns, &c. It is true that formerly there was some thought of filling the batteries with acidulated, moist sand, saw-dust, sponge, &c. but these substances increased too much the electric resistance M. Germain has fixed his attention on the fibre of the coconut and has thereby achieved important results. He utilises not the inner tissue of the nut but the outer fibres. The raw material is separated, stamped to powder, and cleaned. The product turned out, looks then like powdered cocoa. Its density amounts to no more than 0·08. Its compressibleness is such that, by pressure with the hand only, its volume can be diminished one-third. When thus compressed the material possesses a density of 0·22 which is 3 or 4 times that of sponge. Its absorbent properties greatly exceed those of all other known substances. It takes up its own volume of water, and strangely enough, its whole volume amounts then to hardly a little more than that of the fluid alone. It is a bad conductor of heat, but prevents from evaporating or freezing, the substances with which it has been mingled. It is perfectly insoluble in most acids, salts and lyes. Under these circumstances, batteries without fluid adjuncts have been invented. Some have even been put together of great power and remarkable lightness. The electric resistance on application of the coconut fibres is almost the same as when fluids without fibres, are used. M. Germain's method of applying electrically the so-called cofferdam and woodite, makes it possible to put batteries together, which cannot become exhausted with the additional advantages of handiness and lightness. In course of time, this will lead to light batteries and accumulators, intended as electric motors for cars, torpedo boats, and balloons. The above described discoveries show that waste products often only need research, conducted in the right spirit to become useful and serviceable in the arts and sciences.

JOHNSON GRASS.

The following letter, received by the Secretary of the Planters Association, from Mr. D. Wilkinson, accompanying a small packet of the above grass seed, was read at the meeting of the committee held on Thursday evening last and is now published for general information. It will be noticed that packets of the seed can be obtained from the Secretary, upon application to this office.

"To the Secretary,
"Planters' Association.

"SIR,—Having just received from the Department of Agriculture, U. S. America, a small quantity of 'Johnson grass' *Sorghum Halapense* seed, I beg herewith to forward a packet for distribution through your association, to stock breeders and those interested in the improvement of pasturages in the colony, by the introduction of suitable grasses. Perhaps I ought to state something of the history, and how I obtained the seed of this very highly recommended species, and for general information, what is known of it.

"In reading the *Australian* in America (by Mr. Dow, special correspondent of the *Melbourne Leader*, a book full of useful any interesting information) in the chapter on 'Grasses,' Mr. Dow says:—'The Johnson-grass has strong, vigorous roots, like sugar-cane, and has an abundance of long broad leaves. It grows to a considerable height when cultivated, for bad on bottom lands, while it thrives well as a pasture grass on the uplands, being hardy and resists drought.' Acting on his recommendation that 'any person desirous of trying any of these special grasses described should apply to the botanist of the [illegible]al Department of State, Washington.' I received a most [illegible]d courteous reply, with some of the seed from F. O. [illegible], Esq., the acting Commissioner of the department, who shall be pleased to send you a large quantity, but 'am restrict myself to a small quantity by mail only, which I [illegible]il reach you safely and prove to be the nucleus of supplying [illegible]ble forage plant to your colony.' From the same authority [illegible] thus described:—'It is a perennial rapid grower, having like roots, or more properly, underground stems, every joint of which is capable of developing a bud. These literally fill the ground. Short pieces of roots planted in rows two feet apart, and from one to two feet in the row quickly form a sod over the entire surface. It is exceedingly difficult to eradicate. Do not sow or plant where you expect to cultivate the land. Some plantations of Johnson-grass are more valuable, acre for acre, than the best cotton land. One bushel of seed (28 lbs.) is sufficient for an acre. Brush [illegible] the seed, or use the roller, as it must be covered lightly. For hay cut it as often as it obtains the height of 24 to 30 inches. On good soil it yields from two to three tons per acre and can be cut th[illegible] times during the summer in the Gulf States. It is not regard[e]d as being hardy, north of where cotton is successfully grown.' In a note just received from Mr. Holmes, whose practical knowledge as well as the time and careful attention he has devoted to the successful introduction and cultivation of useful grasses, at once constitute him an authority, he says:—'I have sown a little of your 'Johnson-grass' to test its soundness, but I have little doubt about it as the seed is hard and glossy. It is a great acquisition to our grasses if half what they say of it be true. The only doubt in my mind is whether a grass that stands such for[ms] as in Kansas, &c., will equally thrive under our tropical [illegible] still the genus *Sorghum* is, as a rule, quite at home in hot countries.'

[P]erhaps I ought to apologise for this intrusion, not being a [m]ember of your association, but hope some of your members, and [perh]aps others, may be disposed to try and prove whether grass is adapted to our climate and soils, that it may assist in [a] degree in the permanent improvement of our stock pastures. [I] have &c.,

D. WILKINSON.

[illegible] *Times*.

CHINA GRASS, OR RHEA FIBRE.

At a meeting of the Society of Chemical Industry, held in Manchester, Eng: on the 2nd instant, Mr. A. Sansone, Director of the [Sc]hool of Dyeing, in the Manchester Technical School, read a paper [on] China grass, or rhea fibre. He said that after giving the matter [consider]able attention, and after experimenting for several months [on] green and dry stems, he thought that if the fibre were [to be used] it must be produced at a price as low, [if] not lower, [than that] of cotton, therefore the methods of treatment must not [be expens]ive. Division of labour would have to be resorted to in order to accomplish that end successfully. In large plantations it would be difficult to obtain the number of persons necessary for peeling off the bark by hand when they were needed, while if machines were employed a large number would be required which would mean a large outlay. He had, therefore, devised methods for doing the work all the year round. One method he proposes is a very simple one. The stems, either green or half

dry, or even dry, are simply boiled with a solution of carbonate or caustic soda; the bark can then be peeled off with the greatest ease. With green stems five to ten minutes boiling would, he said, be found necessary, while the drier they were the longer they required to be boiled. He stated that he had on many occasions peeled many of the stems in his laboratory without the least difficulty. Even dry stems of several months' standing had been peeled off in the laboratory at the School of Dyeing after being boiled in the model boiling kier possessed by the school. Specimens were shown in the different stages, finishing with the bleached fibre which Mr. Sansone had extracted with the help of some of his pupils' by a chemical process. With regard to countries like India, where the drying of the stems is impossible in the rainy season, he proposed that the stems when freshly cut should be placed in pits or cisterns with a solution of sulphurous acid or bisulphide of soda or lime, which could be readily and cheaply produced on the spot. This would prevent fermentation, and would keep the stem fresh until they could be treated by any suitable process of decortication. Green stems obtained by him from Kew Gardens last summer were kept for several weeks in his laboratory, and were at the end found perfectly sweet. They were afterwards treated without difficulty for the extraction of the fibre. He had noticed also that the fibre was even bleached to a certain extent by that treatment. He suggested a method of un-gumming, and partial bleaching of the fibre at the same time by successive boiling with alkalies, and afterwards immersing the material in a cold sulphurous acid or bisulphite solution, this treatment to be repeated once or twice according to the state of fibre required. The bleach of China grass was, he said very similar to that of linen and cotton, and the same precautions should be taken in employing hypochlorites; bleaching, however, of China grass was very easily effected, in fact more easily than in the case of flax. In all cases the hypochlorite of lime should be avoided and soda or magnesia salts used instead. For scouring the fibre or ungumming the bark such agents as lime, resin, soap and mineral acids could be used just as well as for other vegetable fibres. The dyeing and printing processes offered no great difficulties but by dyeing the fibre before spinning, brighter colors were produced and the fibre was more lustrous. Some colours, however deprived the fibre of its lustre. In conclusion, he recommended the utilization of the wood residues of the stems for industrial purposes. He had made a great many experiments and considered the material very suitable for manufacture into a kind of wood pulp suitable for paper-making, and for other purposes. By that means two products would be obtained at the same time from the same plant.
—*Bradstreet's.*

THE CONVERSION OF TIMBER.

BAND SAWS *vs.* CIRCULAR SAWS

THE question of how to best convert, into marketable form, rough log, is one of the most important problems in all countries where timber is grown in any quantity, and it is therefore not surprising that Mr. Lewis Ransome's paper on the subject, at the Institution of Civil Engineers, on Tuesday, the 10th of May, attracted a numerous audience and provoked an animated discussion.

Mr. Lewis Ransome, who is connected with the well-known firm of engineers at Chelsea, A. Ransome and Co., recently visited the United States and Canada with a view to studying the systems of conversion in vogue there, and his paper has for its object to point out the different manner in which the rough timber is treated in America, as compared with the accepted system employed by the English mill-owners. Mr. Ransome's paper was of so interesting a nature that we make no apology for the following somewhat lengthy summary of his remarks:—

During a recent visit to the United States, the author struck with the ease and rapidity with which rough logs were handled and converted into lumber, and thought a short paper on the subject might be of interest. The centre of the pine-growing district is Michigan, and the Saginaw Valley, in that State, turns out probably more lumber than any other timber-producing district of like extent in the world. The sawmills are situated on the banks of the river, between the towns of Saginaw and Bay City. The general arrangements of all the mills is much the same. They are built of wood, in two stories, the machinery being fixed on the upper floor, while the lower floor, or basement, is reserved for the shafting, belting, and foundations of the heavier machines. They are generally situated on the river-side, the end at which the timber enters being close to the water's edge. The logs, which have been floated down the river from the woods where they have been felled, are collected in the mill-boom, a space of water enclosed to prevent them from drifting away. A man stationed on a platform in the water guides the floating logs one by one, into a wooden trough inclined from the water to the upper floor of the mill, up which the logs are carried by 'dogs' fixed at intervals to an endless chain constantly revolving in the trough. On arriving at the mill floor, the logs are deposited on V-shaped, driven, rollers, provided with spurs, which deliver them on to a platform. A man standing on this platform controls, by means of a lever, a steam 'log-flipper,' with an incline towards the carriage of the circular or the bandsaw, as the case my be. The logs are held in position while being fixed by an ingenious machine commonly known as a 'steam-nigger.' Several methods of feed are employed in these mills; but the usual plan consists of a steam cylinder fixed immediately below the floor-line, and corresponding in length with the travelling carriage. In addition to the large circular saw, and band-saws, a vertical frame or gang-saw, is employed for cutting the slabbed logs into boards of any required thickness.

In order the better to appreciate the respective merits of circular-saws and band-saws, the construction of both machines was described, as well as the mode of treating the saws in each case; their relative advantages being considered under the following heads:—1. Rapidity of production 2. Quality of work. 3. Power consumed. 4. Waste of wood.

As regards rapidity of production, the circular saw has at present a decided advantage, producing on an average, in white pine, 50,000 square feet of lumber, 1 inch thick, in a day of ten hours; while the band-saw in the same time turns out on an average about 35,000 feet. It should, however, be borne in mind that the circular saw, having been in use for so many years, has probably reached its utmost limit of production, while, on the other hand, the band-saw, having been but recently introduced for this purpose, is capable of considerable further development. This assumption is confirmed by the fact that a band-saw mill of the most improved construction has been known to produce as much as 52,000 feet in a day of ten hours, the product of one hundred and two logs.

As regards quality of work, the advantage is undoubtedly on the side of the band-saw, for whereas it is practically impossible to run a large circular-saw at a high velocity without a certain amount of vibration, which naturally produces a somewhat rough surface, a band-saw being packed immediately above and below the cut, passes through the log in a straight line; and, moreover, as the teeth of a band-saw are considerably finer than those of a circular-saw, they produce a smoother surface.

It is unfortunate that, owing to the question of power being so little considered in America, and to the fact that the application of the band-saw for logs is comparatively new, no authentic tests as to the power required by the latter machine have as yet been made with the indicator; but by comparing the engines usually em[illegible] to drive both the band and circular mills an approximate idea on this point may be arrived at. To drive a circular-mill with a 6-foot saw, an engine with a cylinder 18 inches in diameter, a piston-travel of 500 feet per minute, and an average pressure on the piston of 40 lbs. to the square inch, is generally employed. Such an engine develops 154 indicated H.P. To drive a full-sized band-mill an engine with a cylinder 12 inches in diameter, working under similar conditions as to piston-speed and average pressure, is recommended. This would develop about 68 indicated H.P., or considerably less than one-half that required to drive a circular mill.

The last, but certainly not the least, important point, is the question of waste of wood; and here again the band-saw gives by far the best results. The amount of wood lost in saw dust, per cut by a circular-saw, is 5-16th inch; therefore when producing boards 1 inch thick, the waste is 24 per cent. A band-saw, at most, wastes 1-8th inch per cut, or, when cutting 1-inch boards, 11 per cent. Again, to make a board cut by a circular saw, when planed on both sides, hold up to 7-8th inch, it must be cut 1 inch thick, *i.e.*, 1 16 inch must be allowed on each side for planing; while, on the other hand, owing to the superior cutting of the band-saw, it is only necessary to allow 1-32nd inch on each side for planing, showing an additional saving of 1-16th inch per cut. This gives a total saving of ¼ inch per cut by the use of the band-saw.

The foregoing calculations apply to timber of such a size as can be converted by a circular-saw 6 feet in diameter; but for larger logs it is necessary to employ an overhead-saw, and as the tracks of the two blades never exactly coincide, the boards thus sawn show a joint, which necessitates a still further waste of wood. This objection does not apply to the band-mill, which will saw through logs of any diameter.

It is thus evident that, for the conversion of pine logs, the balance of advantage lies distinctly with the band saw; and if this is so in the case of comparatively small and cheap timber, it is certain that for the more valuable descriptions of hard woods, which frequently run to very large sizes, these advantages would be enormously increased; and it is not too much to say that the band-saw mill, in a few years be universally employed in preference to any other machine for the wholesale conversion of timber."

The discussion, which followed, was taken part in, among others, by Mr. Edward Woods (President of the Institution of Civil Engineers) Sir Frederick Bramwell, Mr. Meredith, Mr. Cowper, various saw-mill engineers, and other authorities on the subject, and tended to show that while, with the American machinery, more work was turned out, this was counterbalanced by the immense amount of horse power employed, and the question as to whether the work was sufficiently good was more than once raised.

The statement, which Mr. Ransome made that band-saw mills are the machines of the future for the conversion of logs seems certainly somewhat daring, and we are of opinion that it will take some time before English mill-owners will discard their existing plants of machinery in favour of band-saws. But on the other hand it must be remarked that Messrs. Ransome & Co., have been constructing band-saw mills for logs for many years before their universal adoption in the States, but that such machines have only formed a market in foreign countries and some of the colonies, as there has always been an impression among English saw-mill owners that these machines were unsuited for dealing with anything but curved work and 'deals.'

NITRATE OF SODA: ITS USE AND ABUSE.
VIII.

BY CAMBUSLANG.

ARTIFICIAL GRASSES.

ON no class of plants has nitrate of soda a greater effect than on e cultivated grasses. Where land is in ordinary condition, or here mineral manures have been supplied in sufficient quantity, trate of soda, applied with discretion in regard to quantity and me of application, will always give a good return. Average class nd in any locality, be it either sand or clay, capable of producing, say, one ton of hay per acre, will, under ordinary circumstances, only produce a few cwts. more, *no matter how large the quantity of*

mineral manures used. Let nitrate of soda, however, be applied at the rate of from 2½ to 3 cwt. per acre, and under favourable circumstances the produce will, in all probability, rise from 25 cwt. to 2 tons, 2½ tons, or even 3 tons of hay per acre. Nitrate of soda is, in practice, seldom used in such quantities as the weights here named, as in some localities it may cost more to produce it by nitrate of soda than it is worth. Where an early cut of hay is wanted for any purpose, light manurings of nitrate of soda may be used early and repeatedly, for no class of plants use up more thoroughly what nitrogen is applied to them or produced naturally in the soil than do the cultivated grasses. Near large towns, or under any other circumstances where a cut of early soft grass is valuable, nitrate of soda forms the best medium for obtaining it. As soon as the first symptoms of spring growth are visible, light manurings may be applied every two weeks. In climates moderately dry, in the spring the manurings may be fairly heavy, and applied at once or twice will be sufficient; but where the rainfall is more or less heavy, three or four manurings will give the best return. It is only in exceptional cases that the application of nitrate of soda to the cultivated grasses will not pay, these cases being lands very deficient in minerals, or so far distant from a market that considerable cost is incurred in the carriage of it thither, and the crop is of very little commercial value when grown,

In an average season a manuring of from 2 cwt to 2½ cwt may be calculated to produce one ton of hay provided it has been put on in the proper time and in the proper quantities for the climate, always presuming that the land contains a sufficiency of the mineral ingredients of plant food. In circumstances which are favourable a much less quantity may produce similar results, from the plant having got a good start. The mechanical effect thus exercised by nitrate of soda is often very great, for every farmer in every climate knows that any crop dwarfed in its earlier stages by any cause never becomes a favourable specimen, no matter how favourable the subsequent conditions may be

Among horse keepers a considerable amount of antipathy is shown towards hay grown with nitrate of soda, as they consider it stimulates the urinary organs, and is productive of the disease called diabetes, or, as it is popularly called jaw-pish, My impression is that hay excessively manured by nitrate of soda, or even urine, may, I will not say is, be productive of such a result, but more from the crop having been a heavy one, and not so easily dried, it is apt to be more or less spoiled either before being got, or in the getting, and under both circumstances I know it will then be productive of the bad effects referred to. Prejudice, too, has a good deal to do with the cry against nitrate of soda in that respect, as any one meeting with that class of men can easily find out Personally, I have been an extensive user of hay to horses and stock of all kinds for many years, and although in some season the hay may have been said to have been grown with excessive quantities, and in others entirely without it, yet, when the hay was equal in either respects, I have never even in a single instance been able to attribute any disease among stock as being purely and solely caused by the use of nitrate of soda as a manure. I feel confident on this matter, and have in consequence very strongly expressed myself on the point There is however little doubt but that nitrate of soda, like ordinary stable manure or urine, applied in excess does hurt the quality of the hay. The crop is so quickly grown and the straw so soft that it lies down and rots before it is cut. A very heavy crop of hay is also more easily spoiled by inclement weather. These effects are however, abuses in the use of these manures and not inherent defects pertaining to all or any of them.

One very noticeable effect however, belongs to hay heavily dressed with nitrate of soda, *viz* that the bottom knot of the stalk often tastes quite salt when chewed whereas in other circumstances, it is generally very sweet. Whether or not this is a deleterious effect I am not prepared to say, or whether it is caused by any others manures or combinations of circumstances I know not. One hurtful effect of nitrate, of which no doubt remains is its effect on clover when sown among the cultivated grasses. Under such circumstances nitrate of soda invariably more or less hurts all the clovers and if heavily applied it quite kills them.

PERMANENT MEADOW.

To permanent meadow-land nitrate of soda may be applied economically in suitable districts in quantities up to 2½ or 3 cwt per acre, above which it is not advisable to go, As soon as growth has fairly begun it should at once be applied all at one time in all the dryer climates, while in the damper ones it may be use at two or three times, according to the wetness of the climate.

In districts at all liable to suffer from drought, and where the spring rainfall is light, nitrate of soda should always be applied as early as possible. In such circumstances nitrate applied late will do little good, for, owing to the dryness of the soil and atmosphere the nitrate, if it dissolves at all, does so very slowly so that the crop becomes parched before it has derived any benefit from the manure. Under such circumstances I have seen nitrate remain undissolved for the greatest part of a season, doing, of course, little or no good. Had it, however, been used earlier, the plants at the beginning of the usual dry season would have obtained a considerable amount of foliage which would have sheltered the ground from the scorching effects of the sun. Plants which are thickly planted, and have attained a good size by the beginning of the season, are far abler to stand dry weather and bright sunshine than small, thinly planted crops. The latter are shallow-rooted, and the sun soon parches the ground the whole depth their roots penetrate; whereas crops which have received nitrate of soda early in the season, by their luxuriant growth shade the soil from the rays of the sun, and their roots having penetrated the soil to a considerable depth, they get moisture long after shallower-rooted plants are dead, With permanent meadow grass there is very little risk of loss by drainage either in spring or later on, unless the climate be very wet and the quantity used be excessive.—*North British Agriculturist.*

THE CONSUMPTION OF TOBACCO IN ENGLAND.

It may be interesting to smokers to know something about the consumption of tobacco at home, and the amount of revenue derived from it. The Chancellor of the Exchequer took the matter in hand in his last Budget, and we are told that it is already evident that the reduction of the tobacco duty is regarded as a boon alike by the working classes and the manufacturers. From 1842 to 1878 the tobacco duty had grown at the rate of about one hundred and five thousand pounds per annum, and Sir Stafford Northcote not unnaturally believed that by adding another fourpence to it, he could accelerate the rate of its yearly development. Not many months were needed to show him the error of his reckoning. For a number of years prior to 1878, the steady increase of the smoking population had ensured a corresponding growth in the yield of the tax on tobacco. Thus in 1841 the total population of Great Britain and Ireland was rather less than twenty-seven millions, and the consumption of tobacco rather more than twenty-three million pounds, this being at the rate of thirteen ounces per head. In 1851 the population was twenty-seven million three hundred thousand, and slightly more than one pound her head of the fragrant weed was smoked In 1861 the population was nearly twenty-nine millions, and the consumption of tobacco was thirty five million five hundred thousand pounds, or one pound three ounces per head. Finally in 1871 the population was thirty-two millions and the tobacco consumed was forty-three million pounds or at the rate of about one pound six ounces per head. With these figures before him, Sir Stafford Northcote, embarrassed by the stagnation of trade and the difficulty of finding fresh sources of taxation, hoped that tobacco would yield him nine millions of pounds sterling in 1879, if he increased the duty. He found, however, that the poor man would not give an increased price for his ounce of tobacco, which is usually sold by the ounce or half ounce, cost of the former being threepence and of the latter a penny halfpenny. Confronted by the impossibility of getting more than three pence retail for an ounce of smoking tobacco, the manufacturers adopted the course of adding more water to the raw leaf, Taking the ounce as the basis of their calculation, they appealed to Sir Stafford Northcote, showing that out of the threepence paid for it, twopence-halfpenny went to the Government in the form of tax, while the remaining halfpenny was divided between the manufacturers profit and the intrinsic cost of the article. Thus the manufacturer had to work upon a very small margin of profit and felt compelled to sell "drinking tobacco" to the working man, of which the raw leaf is capable of absorbing from fifty to seventy five per cent of liquid in proportion to its imported weight. For the last few years representations have been repeatedly made to successive Chancellors of the Exchequer showing that, in consequence of the augmentation of the tobacco duty by Sir Stafford Northcote in 1878, the working man was smoking a great deal of water and less and less of the important article, in his pipe. To these representations the predecessors of Mr. Goschen persisted in turning a deaf ear, with the result that, since 1883, the consumption of tobacco has not kept pace with the growth of the population To this anomaly Mr. Goschen addressed his attention in the last Budget. Sir Stafford Northcote hoped that the working man would not mind giving threepence-halfpenny instead of threepence an ounce for his shag and birds-eye. This expectation, however, was not realised. Accordingly the revenue suffers, because, as Mr. Goschen puts it, "we do not get duty on water, and the smoker loses because of the water he gets in his tobacco." For these reasons the Chancellor of the Exchequer determined to knock off the extra fourpence imposed upon the unmanufactured leaf. "This," he said, "will, I trust, be a considerable boon to the working classes. It will not affect their pockets, but if they pay the same per ounce they will get a better article for their threepence." At the same time, it becomes necessary to provide that the manufacturers of tobacco do not offer the same watered article which has been retailed for the last seven or eight years. Mr. Goschen therefore proposes to prohibit by law the watering process by which, under existing circumstances, the dealer recoups himself for the increased duty. He might have estimated the amount of water occasionally contained in an ounce of Java tobacco at fifty, or even sixty per cent of its weight without being guilty of exaggeration. Anyhow, he intends to make it illegal in future to sell tobacco containing more than thirty-five per cent of water, which he estimates will involve a loss to the revenue next year of six hundred thousand pounds. This loss he has, it is believed, over-estimated, because the smoking proclivities of the population show no symptoms of abatement, if they get a fair article for their money. A return has just been issued in the United States showing that the American nation pays every year nearly forty millions sterling for tobacco consumed in cigars and cigarettes, and four millions sterling for tobacco consumed in pipes. In addition, the bill paid annually in the United States for chewing tobacco amounts to ten millions sterling, so that the entire sum spent last year upon the commodity by the Americans amounted to the amazing aggregate of about fifty-four million pounds sterling. In England tobacco has long been the most productive contributor to the Customs revenue. The weed was first introduced into Western Europe in 1560 by Francesco Hermandez, who imported some tobacco plants from North America into Spain. The tube, or pipe, in which the Spaniards smoked the imported weed was called "tabaco," and hence came the name which is now so familiar to civilisation all over the world. In Spain it is still called "tabacco," in Germany, Holland, and Russia, "tabak," in France, "tobacc; and in England and the United States, "tobacco." Sir Walter Raleigh, was the first to make smoking fashionable in England and even went so far as to induce Queen Elizabeth "to try a few whiffs of the bewitching vegetable." "The Queen," says Colonel Bird, the founder of Richmond, in Virginia, "graciously accepted of it, but finding her stomach sicken, it was presently whispered by the Earl of Leicester's faction that Sir Walter had certainly poisoned

her Majesty. Soon recovering from her disorder, the Queen obliged the Countess of Nottingham and all her maids of honour to smoke out a whole pipe amongst them." It was little foreseen that in three centuries from that time "the bewitching vegetable" would yield a revenue of more than nine million pounds sterling annually to the British Exchequer, and that a vast majority of the male population of England would as soon think of going without food as of abstaining from its use. The importer of a pound of raw tobacco may do what he pleases with it when he has paid the duty. He may make it up into shag or birds-eye, or into cigars, or cigarettes, or cakes for chewing. A vast amount is worked up into the form of British cigars, which are sold at three pence or even less apiece, and form the vast bulk of the weeds vended upon race courses and in bar rooms. To tax home made cigars would thus be impracticable, not to mention that the popularity of cigarettes has greatly reduced the consumption of their elder and bigger brothers. The only possible course has been adopted by Mr. Goschen, and the boon conferred by him upon pipe smokers will commend itself to those "whose lot it is to labour and to earn their daily bread with the sweat of their brows." In 1786 the net revenue from tobacco in England was about four hundred thousand pounds. Last year the tobacco tax yielded about nine million three hundred thousand pounds. The difference between these two figures will suffice to show the growth of the British population from 1786 to 1886, and the vastly increased popularity of tobacco in the latter year.—*South of India Observer.*

A VISIT TO KEW GARDENS.—I

A VISIT to these world-renowned gardens cannot fail, at any season of the year, of being a source of the deepest pleasure and gratification to all lovers of plants and those interested in their cultivation; but it is more particularly so in the spring time, I think when not only can the tens of thousands of exotics, from all corners of the earth, be viewed with comfort under the shelter of the numerous glass structures, but when the enjoyment is enhanced by a ramble in the extensive and beautifully kept grounds, which at this season assume a most attractive and captivating appearance. The deciduous trees and shrubs collected from many lands and arranged with due scientific care and order are now budding into leaf and flower; the noble ever greens are secretly drooping their sear and yellow leaves, under cover of the new ones which the present warm weather is rapidly developing, the lawns have already put out their carpets and richest green, thrushes, black birds and other birds may be seen hopping about amongst the grass and under the trees, and singing in the branches above, the mysterious voice of the cuckoo comes floating on the still and balmy air, and when old and plant life alike seem to have settled down to a time of deep enjoyment at least so it appeared to me on my recent visit to the gardens. It was a day perhaps the more to be enjoyed as being among the very few yearly warm spring days we have yet enjoyed, since the termination of the miserable north easters we have been experiencing ever since the month of February. It was one of nature's holidays in fact, which had the effect of keeping me on my legs in the gardens for eight consecutive hours in rare enjoyment of its treasures both indoors and out.

On years gone by, when the weather of the earlier months of the year in England was not quite so fickle as it is now-a-days, what is called amongst horticulturists "bedding out" that is, replanting the beds of the flower garden with their summer and autumn flowering occupants was usually commenced not later than the 1st of May, but in these latter days, when spring time [illegible] and when east winds and frosts are so loath to bid us farewell, no one dreams of filling up the beds of the flower garden with plants which produce such glorious annual displays, till the month of May has quite ended, so that the period of leave, as it were, has been extended to the spring flowers proper for displaying their fresh and delicate beauty, by one month.

At the date of my visit numerous spring flowers and alpines were in the hey day of their beauty in the flower beds, borders, lawns, and rookeries. On entering by the Cumberland gate the first thing that caught the attention of the visitor was a charming group of various-coloured polyanthus springing from the lawn on the left of the walk and backed by a row of *primula denticulata*; in front the grass was dotted with plants, in full flower of a pink tinged variety of the wood anemone *anemone nemerosa* the beautiful blue squill *scilla liberica* and one or two other dwarf spring flowers, which had a most pleasing effect. The flowers of the *polyanthus* were large and of the most varied and beautiful colours and with the setting of the velvety lawn where not a suspicion of soil was to be seen, and the other flowers made a group which at once arrested the attention on entering the garden and made it hard to believe that its arrangement was merely the result of accident and not the outcome of careful study on the part of some student of nature. Be that as it may, I think a useful hint might be taken with reference to the grouping of many flowers on lawns instead of on beds and borders as a better means of exhibiting their beauties. Not far from this group might be seen in all their freshness and rare beauty, such spring flowers as *Caltha Pulustrus*, or the March marigold, *Primula rosea*, a most lovely Indian species producing quantities of rose-coloured flowers from a stem 4 inches high. *Muscaria*, or grape hyacinth in great variety, some of the flowers of the intense violet. *Anemone appeninal*, with its delicate pale blue flowers. *Anemone fulgens* that glaring and brilliant flower from south Europe. Christmas rose, in great variety and many curious forms, many kinds of *Symphytum caucasicum*, or comfrey with its different shades of blue. *Gentian verna*, Crown Imperiality, *Primula Japonica*. Hyacinths and tulips too were in the height of their beauty, both in beds of separate colours and mixed, but after seeing the entrance group on the lawn one could not help thinking that both hyacinths and tulips might be similarly treated in their cultivation with a very happy effect. Beds and borders of brown earth be they kept ever so tidy and clear of weeds detract from the beauty of flowers generally. Flowers in a purely natural state of growth are rarely to be seen without the assistance of other plants to hide from view mother earth "and give a setting to their floral companions, and I suppose after all we cannot do better than imitate nature in the arrangement and cultivation of the flower garden. I am tempted to give the name of a few hyacinths as seen at Kew in beds of the ordinary kind which were very beautiful indeed, but what they would have appeared like if similarly treated on lawns I leave to the imagination of your readers. There were several beds of Charles Dickens' single blue with a noble spike and wonderfully regular in size and shape. Grand Silas,—pale blue, also grand spike. Baron Von Thuyl, dark blue, fine flower. Madam Hodson, single red beautiful spike, Grand vanquier, single white, beautiful pure, and noble flower, and giganta another grand white. There were other mixed beds of the above-named kinds and the sight of these beds was one of rare beauty, and the rich scent of the thousands of blooms filling the air. For the benefit of the cultivators of this flower on the Nilgiris, I would mention that the bulbs are cultivated in Holland, from which country they are yearly imported into England in a soil composed mostly of pure sand mixed with a large proportion of completely decayed cow manure, and I should think that success in their cultivation, after the bulbs leave Holland, will depend greatly upon as near as possible an approach to a similar mode of treatment and cultivation.

Amongst other plants in flower of which I made a note at the time as likely to be suitable for cultivation in the climate of the Neilgherry Hills, I would take leave to make particular mention of one which I came upon in the large conservatory or old Palm house, near the Chinese Pagoda, and one which if not already introduced would be likely to do well, and I venture to think would be a great acquisition if included among the garden plants of Ooty. It is named *Viburnum plicatum* and is a native of Japan. It is an evergreen shrub with handsome bronze-coloured leaves and flowers of the purest white, the shoots are long and slender and assume a pendent or drooping habit of growth, the clusters or globes of flowers are produced at short intervals in regular pairs along these shoots, forming long wreaths giving the whole plant a most charming and striking appearance. The old Gulder rose *Viburnumopulus*—is a hardy plant in England and is well known for its white walls of flower so profusely produced in the spring, but the viburnum under notice is much superior in gracefulness of habit and purity of colour as well as size, and has few equals I think as a flowering shrub. A writer in describing the Queen's drawing room a few days ago, says "Cherry blossom and white Rhododendron appeared to be the newest floral garnature for white millinery. Guelder roses are always pretty, but when carried straight down each side of a skirt and then brought upwards to a point in the centre they are particularly charming," and if this be so with regard to the common guelder rose how much more so would it be if flowers of the plant under notice were used. Japanese plants do well in the climate of Ooty as instance the *Camellia hydrangia* and many others. Amongst Rhododendrons in flower in the same house I noticed that grand and magnificent species from the Hymalayas *Rhododendron Auklandi*, the flowers were of a huge size and of the purest white, white a truly noble flower which with its clear pale brown stem and branches and long leaves give the tree a very beautiful appearance. This would also be a grand plant for the Hills. Growing beside it was a large tree of the Neilgherry Rhododendron, large and well shaped and crowded with trusses of its bright scarlet flowers. Another Himalayan species was also in flower *Rhododendron Nuttalli*, flowers very large, trumpet-shaped white, yellow inside, a striking and splendid flower, but not so pure in colour as *Rhododendron Auklandi*. Also in the same house I noticed several plants of a creeper *Hibbertia dentata* from south-east Australia, with very dark shining leaves and single yellow flowers, it struck me as a particularly handsome climbing plant for walls, or bowers and no doubt would thrive well in the climate of Ooty as most Australian plants do. The three species of *Araucaria* from the same quarter of the globe, viz., *A. excelsa A. Bidwilli*, and *A. Cunninghami* were all represented by tall and superbly graceful specimens; these are all easily raised from seed and should be extensively grown on the hills as ornamental plants for lawns, &c., than which there are none finer. In one of the hotter houses I saw a cluster of *Impatiens Sultani*, fine plants in pots drowned in scarlet blooms. This plant is familiar enough at Ooty with you, I have no doubt, but I saw another new species of *Impatiens* also in flower which perhaps may not be so well known *Impatiens Hookeri* from the South Sea Islands stronger and stiffer plant with black polished stem and size shoots and large scarlet flowers a most striking and lovely plant. For hanging baskets let me recommend *Begonia glaucophyllia splendens* as a veritable gem, it is plentifully seen at Kew and also in all the London nurseries, and everywhere it is a beautiful object, when well grown and in full leaf. Covering the sides and tops of the wire baskets it might, I think, be grown to advantage mixed with a few roots of a *devallian* fern of which you have such an abundance growing on the trees in any shola. Another fine plant for covering a pillar, *Begonia lucida*; and for growing in pots or out of doors a companion to *Begonia fuchsioides*, which used to grow so plentifully in the Government gardens, its scarlet flowers making a grand display—is *B. ordorata*, flowers, white and exquisitely scented the plant grows to about the same size as *B. fuchsioides*. Another evergreen, house shrub which in all likelihood would thrive in the climate of the Neilgherries is *Euchiuncaliythrytum*, it is rather a tall growing shrub with light green leaves and long spike of splendid blue flowers. In the spot devoted to orchids I saw many fine examples in flower and was very much struck with the freshness and clean appearance of the structures, every plant looking the picture of health and vigour. Amongst

these orchids not in bloom I may mention *Cœlogyne corrugata*, a dwarf growing plant common in the Neilgherries flowers white with yellow lip striped with orange and forming huge masses growing on sheet rocks on many parts of the hills; the plant at Kew is grown in a large hut and looks healthy, but with leaves much longer than those produced in its native habitat. It was told by the person in charge that the plant had not flowered during the three years he had been employed at Kew, the result, I would venture to suggest. (and I do it with all due deference to the Kew authorities) of wrong treatment, the plant being subjected to stronger heat than is necessary and being kept too far removed from the glass. A thorough knowledge of the true positions in which these plants are found in a wild state and the nature of the climate to which they are exposed would, I imagine, be often as considerable advantage to English cultivators.—HORTUS in the *Nilgiri Express*.

DYSPEPSIA AND CANCER OF THE STOMACH.

"No word ever escapes the lips which carries fuller despair than the word 'cancer.' To have a malignant cancer is to stand every day face to face with death. Cancer does not, however, destroy anything like the number of people that consumption does, and persons sometimes recover from consumption, while the man with a cancerous disease upon his vitals will surely die. No doubt in the onward march of knowledge the mysteries that surround this perverted growth will be made clear, and medicines prove of more avail than now. Already science has done something valuable in this direction, and detected many causes. Mr. Butlin assigns the causes of tumours, in an able article in a recent Manual of Surgery, somewhat as follows:—

"1. Inflammation is a frequent cause of the formation of tumour.

"2. Long continued irritation, as the formation of a cancer of the lip from the irritation of the dry and harsh pipe-stem. Soot cancer in sweeps is another example.

"3. Injury, as to the back, eye ball, breast, has excited a tumour.

"4. A warty growth may become an epithelioma, and so may a chronic inflammation of the surface of the tongue (leucoma).

"5. Age and sex. Fatty tumours are least common in children, and carcinoma and adenoma come in those under thirty. Men are more liable to have a cancer of the œsophagus, lip, or tongue than women. The female sexual organs are prone to cancer. Anxiety and sorrow are thought to play a part, and residence in valleys to be more productive of cancer than on hills and mountains.

"Abnormal growths are strange things. For example, a nævus (mother's spot, mole, port wine stain) may be hereditary or due to an injury. Warts are among other things, indisputably due to irritation. Corns are another example, due to irritation or pressure, and known to be developed upon other parts of the body than the toes, as in coachmen, tailors, &c. In some of the lower animals this has taken place, and become hereditary, as in the ischial tuberosities of Macque monkeys and baboons, whereon they sit (Cynomorphæ), and the callous pads on each of the paws of dogs, cats, and other carnivora Bland Sutton). House maids' knees miner's elbows, are further examples of what irritation may do.

"Turning the attention to the internal organs of the body, it may be inquired—Do the same causes operate there? A measure of circumstantial evidence seems adducible here. Let us go step by step. You all knew 'says Sir William Roberts,' how slowly and how insidiously the gouty diathesis is developed under the influence of diet, and how *it may affect the descendant unto the third and fourth generation.*' Truly, 'the effects of diet are profound and far-reaching and exceedingly subtle.' Take a man with an ulcer, a weak stomach, a diseased kidney, feed him poorly, and how soon the ulcer, the stomach, the kidney tell the story of improper food. The imperfect products of chronic indigestion may ultimately induce disease of the kidney (Dr. Geo. Johnson) by the irritation they cause in passing out. Large proportion of those with cancer of the stomach have been sufferers from dyspepsia for years. It would seem as if the irritation long kept up was very often the prime and sole cause. Again, cancer has often seemed to the writer to be in some occult way a family relator to epilepsy, scaly tetters, and even deafmutism; but, however his may be, one thing would seem border on certainty which is that the dyspeptic with a bad family history is most liable to have a cancer of the stomach. Says Dr. Fred Roberts, in his excellent treatise:—

'As *local causes* leading to the development of cancer of the stomach have been mentioned, long-continued pressure over the epigastrium, injury, and the repeated action of irritants upon the stomach, such as hot spices or strong spirits.'

It cannot be questioned that diet is of great moment in this conection. If a man who is a dyspeptic be taken ill, let his food be peptonised, with Zymine; if he suffers with gastric dyspepsia let him take Pepsine Tabloids; if with intestinal dyspepsia, let him take the Zymine Tabloids; and in bilious dyspepsia, the Comp. Zymine Tabloid will do the great good.—*Family Doctor.*

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Health, Crop and Weather Report.

[FOR THE WEEK ENDING 23RD JUNE 1887.]

Madras.—General prospects good.

Bombay.—Fair rain throughout the presidency, except Sind, where slight rain fell in parts of two districts. More rain wanted for *kharif* sowings in parts of the Deccan. Sowing operations going on in fifteen districts, and completed in the Tanna and Colaba districts. Fever in parts of seven, small-pox in parts of five, and cholera and cattle-disease in parts eleven districts.

Bengal.—Weather hot and cloudy throughout the week. Strong monsoon current is now blowing over the Lower Provinces. Rainfall has been general, and in some of the Northern Bengal districts has been very heavy. Jute, early rice and indigo are generally doing well, but too much rain in North Bengal has done some injury. *Aman* and *bhadoi* sowings going on well. Cholera has somewhat abated in the Patna division. General health is good.

N.-W. P. and Oudh.—Rainfall general. Ploughing for *kharif* in progress. Cane and indigo crops doing well. Supplies ample, though prices are rising. Cholera continues to be reported and is severe in Jhansi. Cattle-disease in a few districts.

Punjab.—Rain has fallen in Delhi, Umballa, Jullundur, Ferozepore, Amritsar, Lahore, Multan, Rawalpindi, Shahpur, and Dera Ismail Khan, and is wanted in Hissar and Peshawar. Health is good, except in Dera Ismail Khan and Peshawar, where it is fair. Prices are slightly rising in Delhi, rising in Rawalpindi, high and stationary in Shahpur, and stationary elsewhere. In Dera Ismail Khan the *rabi* outturn is below average. Fodder is scarce in Shahpur. *Kharif* ploughings commenced in Delhi and Rawalpindi, and sowings in progress in Umballa, Jullundur, Lahore, Multan, Shahpur, and Peshawar.

Central Provinces.—Good rain has fallen in all districts, except Sambalpur. *Kharif* sowings in progress. Cholera in four districts, and fever in one. Prices rising in four districts.

Burmah.—Except some cholera and cattle-disease here and there, the health of Lower Burmah is good. Ploughing well advanced and sowings begun. Reports received from five Upper Burmah districts. Health generally good, and crop prospects satisfactory.

Assam.—Weather rainy.—*Ahu* crop in lowlands being harvested. Ploughing land for *sail* commenced. State and prospects of the crops good. Cultivation of *sail* and reaping of *dumai* and *murai* crops continue. Prospects of tea good. Cholera in Cachar, otherwise public health good. Cattle disease in Gowhati.

Mysore and Coorg.—Rainfall good in Shimoga, Kadur, and Hassan districts, and slight in other parts. Standing crops in good condition. Prospects of season fair. More rain needed in the Bangalore district for agricultural operations. Sowing of rice lands for *kartika* (autumn) crops in active progress. Public health good. Cattle-disease and small-pox prevailing in parts. Prices slightly risen in the Bangalore and Hassan districts.

Berar and Hyderabad.—Weather cloudy and rainy. Monsoon apparently commenced. Sowing of cotton in progress. Ploughing for *kharif* continues and sowing has commenced in places. Cattle-disease and small-pox prevalent, and cholera still reported in Akola. Prices steady.

Central India States.—Rain has fallen (though lightly) generally, the weather oppressive, though cloudy. Prospects of crops good. Cholera has disappeared at Rewa, but is reported at Malhar, and Raoni and Chhatarpur in Nowgong. Otherwise, health good. Prices steady.

Rajpootana.—Weather cloudy and monsoonish. Rainfall has been slight, but general. Tanks and wells continue low. *Kharif* sowings have commenced where favoured with rain; in other places the land is being prepared for this crop. Sugarcane is being irrigated. Prospects are good. Cholera of a virulent type has broken out in Ajmere city, where there were seven cases—all fatal. The disease is also prevalent in other places, with fever and small-pox here and there. Prices rising in five, falling in two, fluctuating in one, and steady in other, States.

Nepal.—Weather seasonable. Prospects fair.

Letters to the Editor.

IS LARGE FARMING PROFITABLE IN INDIA?

TO THE EDITOR.

SIR,—Your contemporary, the *Civil and Military Gazette*, remarks: "The agricultural conditions of India are opposed to any system of large farming, and it would not be safe to assert that even large farming, where it has been tried, has met with a sufficient success to justify its wider application." Your contemporary might well instance the case of the Indigo planters who grow indigo on the advance system, and carry out the manufacture themselves. The managers of the Empress Cotton Mills, are no more cotton planters than the manufacturers of indigo in Bengal and Behar are indigo planters. The only instance in India of large farming is tea-planting. Excepting this solitary instance (and perhaps, I should add, the tobacco farm at Poosah), I think I am safe in asserting that all attempts in India at large farming have failed. Even in these two instances it is the manufacture of tea and tobacco which has prevented the collapse of large farming. The fact is that cultivators in India, who are capitalists and labourers combined in the same person, live upon their wages, keeping their capital intact. So that any farming on a large scale which calculates the return of interest upon the capital invested will be a failure.

I have had seven years' experience of tea cultivation; and I am sure that in merely turning out leaf, the ordinary ryots would beat tea planters hollow. But the growth of leaf and its manufacture cannot be separated. And it is this inevitable association of cultivation and manufacture which has kept the planters above competition with the ordinary ryots. In the case of cotton, the cultivation and manufacture can be separated, and there is not, I believe, a single instance in which an English capitalist has ventured to compete with ordinary ryots in cotton cultivation. The next question is, can the introduction of machinery so economise labour as to be more profitable than hand labour? I think on all tea gardens hand labour has been superseded by machinery in tea manufacture (rolling, drying, and sorting). But the real truth is, that hand labour on tea gardens is very dear. The planters pay about Rs. 4 to a coolie per month; but taking into consideration the cost of importing, housing, and doctoring them, the cost per head cannot be less than Rs. 10 per month. It is the costly labour which is the principal cause of the introduction of machinery into tea-gardens. I do not think rolling and drying machines are so common in Chota Nagpore gardens as they are in the Assam gardens. But then on tea gardens, as every where else, it is manufacture proper that machinery has touched. It is a regular fashion to charge the Indian ryots with stupidity for not using mould-board ploughs; but in tea gardens you see neither mould-board ploughs nor Indian *langals*. In farming, or cultivation proper, there is not the slightest substitution of hand labor by machinery.

The *Civil and Military Gazette* says: "The better class of cultivators till the lands and turn out crops in a fashion that shows they have but little to learn." I may add that the better class of cultivators do not hesitate to introduce innovations whenever they find that these pay well. Even in a backward place like Samonghattee, *Sirdars* and *Pradhans*, who are large farmers, cultivating over 50 acres, tried last season the

Behea Sugarcane Mill, and are combining to buy a few Mills for next season. The great popularity of these Sugarcane Mills in Bengal proves that the better class of cultivators are not slow to profit by innovations.

S. DATTA.

June, 23.

Editorial Notes.

Advices from Mauritius state that the weather there has been very favourable lately for the sugar plantations. It is already predicted that the cane crop for 1886-87 will be a good one, and exceed that of the previous year by a great deal.

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Advices from China state that the tea crop this year is a very bad one. Reports from Foochow say that it will be worse than that of last season, while the crop in Formosa is said to be one of the worst on record. These are gloomy prospects.

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We note that that indefatigable worker, Surgeon-General E. Balfour, author of the *Encyclopædia of India*, has brought out recently a book entitled the "Agricultural pests of India, vegetable and animal, injurious to man and his products." The subject certainly is a very comprehensive one, but knowing the author, we are not at all surprised to hear that he has brought together for the first time in a handy form, all the valuable informations on the subject.

A horse show was held at Simla a few days ago, but it appears to have been a sort of 'social diversion,' more than anything else, and has no bearing whatever on the question of horse-breeding or supply in this country. It was merely a display of "all sorts and conditions of"—horses, owned by private individuals, for hack or other purposes. It is possible that in future years the 'show' may develop into something more important, from which practical results may be expected.

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The Singareni coal has a future before it. An experiment was recently tried of using it in an engine of a train running between Secunderabad and Hyderabad. The report of the driver was that he obtained speed with this coal equal to that when English coal was used, and faster than with the use of Raneegunj or Chota Nagpore coal. Further, that after burning, the coal gave only a] small percentage of ashes, and emitted very little smoke. These are all favourable characteristics.

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Indian indigo is threatened by a formidable rival from quite an unexpected quarter. The Resident-General of the French Republic in Tonquin and Annam has reported to the French Ministry of Commerce and Industry that the soil of Tonquin is singularly well adapted for indigo cultivation. Great improvements in methods of cultivation and manufacture are already said to have followed the French colonisation, and most important of all the Tonquin product is declared to surpass that of Bengal in the colour and quality of the dye it yields. This is serious news for Indian planters, who already find indigo cultivation unprofitable enough in other respects.

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A correspondent, referring to the deputation of Mr. Collingridge to Java, to discover how it is that the Dutch planters turn out indigo superior to that manufactured by the Behar planters, writes to us to say that "this clearly shows that there are at present, among Anglo-Indian planters and Government officials, no experts capable of giving a trustworthy opinion as to the cause of the falling off in the manufacture of indigo in Behar. The Bengal and Behar indigo was once upon a time held to be the best in the world; but now, alas! it is considered actually inferior to the Java product." After commenting upon this curious and deplorable state of things, he tells us that he knows of an expert capable of "discovering the true cause of this falling off in the quality of the Behar indigo, without having to go to Java for the information." But he has omitted to favour us with the name of this expert. We shall be glad to hear from our correspondent again on the subject; we hope he will name the expert for the benefit of indigo planters in general.

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Messrs. J. Mackillican & Co., send the following exract from the letter of the manager, Arcuttipore Tea Estate to the local Agri-Horticultural Society, regarding Coca:—"The ten small and extra weak seedlings which were sent up, are now strong and well developed plants, they are growing at the present season (January), which shows that the climate is not too cold for them." Messrs Mackillican and Co. were asked to obtain some Coca leaf, so that an analysis might be made to ascertain whether it retains its properties grown in India and at a low elevation; they wrote to their manager and obtained a sample of one ounce, which however does not appear to be enough for analysis. The leaf has been well dried and the green color has been retained, so that its appearence is much superior to a sample dried in Calcutta from fresh leaf obtained through Messrs. Davenport and Co. from the Central Terai Tea Co.

The *North China Herald* says: "The crisis that has been so long impending in the China tea trade seems at last to have arrived, and the native tea packers who have been living on upon the prestige, acquired before India and Ceylon had shown how tea should be picked and packed, will at last have to succumb or be compelled to reform their ways. Against the bright uniform infusions of Indian teas, the China teas exhibit a mixture of dark decayed leaves throughout. The natives attribute this to want of rain previous to the picking time, and to excessive rains after the picking had begun. Be this at it may, the fact remains that worthless leaf has been fired and packed *en masse*, upon which heavy charges and duties have to be paid, which the buyers for London at least decline so far to make good. For Russia and America, where Indian teas have not yet made their way, shippers take what they can get, and in doing so are paying prices which judged by intrinsic quality, are often positively higher than last season's. The only teas with any flavour at all are the Keamens, and these have been taken to some extent for London at 2d. to 3d. per lb. over present values in that market."

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We learn from the home papers that a meeting attended by about five hundred farmers was held in the Sheldonian Theatre, Oxford, on May 28th, for the purpose of discussing the severe and increasing depression in agriculture and its dependent trades. Mr. E. W. Harcourt of Nuneham Park, presided. Six resolution were carried, to the effect that trade depression was increasing and threatened the extinction of our chief home industry, and urged upon Parliament the need of sinking all party differences and taking combind action to avert the ruin which appears imminent; that the depression is due chiefly to low prices caused by unrestricted free imports, and that the only adequate remedy is to be found in an adjustment of our fiscal system; that the incidence of taxation should be so adjusted that all kinds of property should bear an equal share, and the land relieved of the excess which it now contributes; that a Minister of Agriculture should be appointed, and that copies of the resolutions be forwarded to Lord Salisbury, Mr. Gladstone, and others. The proceedings which lasted four hours, were unanimous.

An important paper on tobacco cultivation in India has been submitted to the local Agri-Horticultural Society by Mr. Reinhold. [illegible] this Mr. Reinhold advocates the fostering by Government of the cultivation and manufacture of a superior class of t[illegible] in India as a means of restoring the balance, and largely increasing the export trade of India. He thinks, that the present depression in the rates of exchange give an exce[illegible] opportunity of developing a trade which would compete on advantageous terms with other exporting countries ha[illegible]nly gold currencies. As an inducement to capitalists Mr. Reinhold shows that Government might advantageously move in the matter, and by associating itself with a syndicate of merchants and zemindars, and by making exhaustive demonstrative experiments on a commercial scale, prove the adaptability of the Indian soil and climate for producing a first

rate tobacco, equal to competing with the best in the markets of the world. Mr. Reinhold gives statistics to show how the price of tobacco has been maintained in the face of the shrinkage in values of coffee, sugar, tea, wheat, cotton, silk, flax, wool, and indigo; and bases on this some portion of his argument on the commercial advanatges, which would follow the development of a trade in this product. In an appendix a carefully compiled estimate is given, taken principally from the reports of district officers, written when Government was making inquiries on the subject of tobocco cultivation. The estimate shows the expenditure which would be incurred in cultivating and curing the tobacco off 2,000 acres of land under European supervision. The paper will be discussed at the next meeting of the society.

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A MEMORANDUM, dated the 20th instant, from the Revenue and Agricultural Department of India, informs us that it has now published returns of Agricultural Statistics of British India for the year 1885-86. In 1882, the Secretary of State desired that a set of tables containing some of the leading statistics of British India should be compiled on a uniform basis for inclusion in the "Statistical Abstract of British India" presented to both Houses of Parliament. It was found necessary to convene a conference of officers representing the different provinces, and the meeting was held at Calcutta in December 1883, when the conference drew up a set of forms in order to secure greater uniformity and accuracy in future in the exhibition of these agricultural statistics. The present volume indicates the result of the labours of the conference for 1885-86, the second year for which returns have been prepared, and contains the following tables, viz.:—(1) area cultivated and uncultivated; (2) crops cultivated; (3) irrigation; (4) prices of produce; (5) surveyed and assessed area; (6) varieties of tenure held direct from Government; (7) register of transfers; (8) agricultural stock. The returns will be published annually, and will contain the latest available statistics in each year. The Department of Land Records and Agriculture have made, and are making, arrangements for the gradual improvement of the statistics.

THE cotton industry at home appears to be in a very depressed state just now. In fact it is a parellel to the state of the Jute trade out here, as will be seen from the following quotation from a home paper:—"An important meeting of master cotton-spinners, to which also manufacturers were invited, was held in Manchester on May 27th, to consider the advisability of running short time, in consequence of the adverse effect upon spinners of the specultive operations of cotton brokers at Liverpool. There was a very large attendance, the whole cotton district, including Lanchashire, Yorksire, Cheshire, and Derbyshire, being well represented, Mr. Henry Harrison, of Blacburn, was in the chair. Mr. Ogden (Manchester) moved, "That, in the opinion of this meeting, it is most desirable, in the interests of the trade, that all spinners shall at once resort to short time; that such short time shall consist of reduction of the working hours equal to half-time, for a period of eight weeks from May 30th, and may be carried out either by closing three days a week, by alternate weeks, or by continuous stoppage. The resolution to take effect only in the event of spinners representing two-thirds of the spindles; sending in to the Cotton Spinners' Association an undertaking to carry out such resolution." The proposition was carried with only two dissentients. The secretary was instructed to prepare suitable circulars asking for replies from each firm of cotton spinners as to their agreement or otherwise with the resolution."

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 23rd June, 1887:—Except in the Punjab, Madras, and Rajpootana, where the rain has been slight, there has been generally a good fall throughout the country during the week under report. *Kharif* sowings are most advanced in Bombay and the Central Provinces; in the North-Western Provinces and Oudh, the Punjab, Berar and Hyderabad, and Central India and Rajpootana, the preparation of the land for the *kharif* crops is being actively prosecuted. In Madras, Mysore and Coorg, agricultural prospects are good. The autumn sowings are progressing well in Bengal, where the early rice is also thriving. Rice is being sown in Bombay, the Central Provinces, Coorg, and in Burmah ploughing for the crop is well advanced. In Assam three varieties of rice are being reaped, and the cultivation of a fourth is progressing. Heavy rain in Bengal has done some injury to indigo; but in the North-Western Provinces and Oudh the prospect of the crop is good. Sugarcane is doing well in the North-Western Provinces and Oudh. Cotton-sowing has commenced in Berar. The public health is generally fair, though cholera is more or less prevalent everywhere, but especially in Bombay and the North-Western Provinces and Oudh, where the mortality in a few districts is still high. Prices continue to rise in the North-Western Provinces and Oudh, and in two districts in the Punjab. Elsewhere they are generally stationary.

A CORRESPONDENT of the *Ceylon Observer* sends the following answer to the question: What is a 'break of tea':—So much misconception seems to prevail in Ceylon as to the meaning of the term 'Break of Tea,' that I send you a few lines which I trust may throw a little light upon the subject. The following example will best serve the purpose of demonstration:—

Per S. S. *Clan Scot*, Jubilee Estate:—

1-18	 18	Boxes of orange pekoe
19-25	... ... 7½	Chests broken pekoe
26 37	 12	Chests pekoe
38-67	... ... 30½	Chests pekoe souchong
68 97	 5	Chests dust
73-97	 25	Boxes broken mixed

97 packages tea.

Many men in Ceylon having sent off this quantity would state that they had just shipped off a 'break' of 97 packages, a complete misnomer, and one likely to confuse the home consignee very greatly. These 97 packages can be referred to as an "invoice," a "shipment," a "consignment," but never correctly as a break, except in the single instance of the whole having been packed as unassorted, or all of one kind. The invoice will be seen to comprise six breaks. These I have designedly arranged so as to exemplify the difference between sampling and non-sampling: breaks 26-37, 38-67 and 73.97 are sampling breaks (by the trade for such, viz., 8 chests, 8½ chests and 20 boxes); 1-18, 19-25 and 68-72 are non-sampling breaks, for the reason that all are below the limit fixed. Non-sampling breaks are never put on show at the docks or warehouses, and suffer as well from being in all cases sold at the termination of the regular auctions.

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THE age to which the tea plant attains is now being discussed by planters in Ceylon. On this subject our Ootacamund contemporary writes:—"In the island the industry is of very recent date, but in Assam and in Southern India the tea plant was introduced half a century ago, and has since then continued to flourish. Our oldest tea plantation is Manns tea estate at Coonoor, now owned by Mr. Reilly, which must be over thirty years old, and shows no sign yet of giving out, though doubtless many of the old China plants have been replaced by the valuable Assam hybrids. The late Captain Rae's estate at Kulhutty perhaps an undesirable locality for many reasons, dates as far-back as 1855—or thirty three years ago, and fine specimens of the plants are to be seen here also. Balfour's Cyclopædia says:—'The tea plant does not yield leaves fit for the manufacture of tea until the third year; it increases yearly its produce until the eighth or tenth year, at which time it attains its maximum. It has been found indigenous in Assam and Cachar, aged it is averred, sixty and seventy years, and still producing leaves of an excellent quality. A tea plantation may be compared to an English orchard—a property producing an income during the life time of the planter and passing to his descendants.' The drastic treatment that the plant survives, proves it to be a marvellously hardy plant, and 100 years would not too be long a life to concede to it." We may add that in China there are tea plants the exact age of which it would be difficult to arrive at. We should certainly pronounce them considerably over 100 years. At any rate, the celestials themselves say that the tea plant lives to a

ripe old age : whether it will do so in India, remains to be seen. We have not yet had time to judge.

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REFERRING to the subject of fungi on the roots of tea bushes, noticed by us last month, Mr. Grant, Manager of the new Cinnatolliah Tea Company, Ld., Assam, writes to the local Agri-Horticultural Society as follows:—"Finding no allusion to certain kinds of tree-roots killing the tea-bushes round them, I take the liberty to inform you for the benefit of others, that the roots of the *Soom* (on the leaves of which the Assam Mooga Silk-worm is fed) and *Bookain* (*Melia Indica*) a kind of *pariah* Neem, unless removed when a clearance is made for planting tea, always destroys the tea planted round the stumps, and unless the root is *entirely* (including latterals) removed, it will be difficult to get tea to grow near it for years. I myself have seen numbers of instances ; in some places the tea-bushes were destroyed within a radius of 15 feet from the stump. Though there are other tree roots that have the same effect, the above two hardly ever fail when the tree is cut and the root left in the ground to decay, otherwise if left growing, they do not seem to effect the tea-bushes. The only way is to remove the stump entirely and re-plant the spot, sacrificing even a few bushes, as they will invariably die in time if the roots are not entirely dug out." The subject being of some importance to tea planters, Dr. King, of the Royal Botanical Gardens, Seebpore, was consulted, and this is what he says in reply :—"An analysis of the wood of the two trees you mention would not, in my opinion, be of any use. If experience shows that the wood of these is especially affected by this dangerous fungus, all stumps of these species should be up-rooted. But I do not think that by an analysis of their wood, we should learn the cause why the fungus prefers them. If the dead stump cannot be actually dug out from gardens where they have been left, they might be isolated by digging a trench round them, so as to prevent the spread of the fungus from them to the surrounding tea-bushes."

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WE reproduce an important paper this week from our Lahore contemporary on the subject of cattle-breeding for the plough. The question therein raised is one that must be considered in all its bearings. It is said that, the breaking up of pasture areas is due to the increasing value of the products of cultivation, and the increasing pressure of population upon the soil. But does it necessarily follow that because lands are taken up for cultivation of products which realize a larger income than grasses, therefore cattle must starve, diminish in number, and increase in price? We say, No. The question resolves itself into the consideration of improved methods of storing corn-stalks for feeding cattle upon, when the harvest has been gathered, and there is no work for them, or in seasons of drought and scarcity. Lands are not at present utilised to their full capacity, *i.e.*, only such crops are grown as are known to yield a sure outturn, and in the manner handed down from remote ages. Diversified cropping is not practised by the ordinary ryot to the best advantage ; add to this that no adequate provision is made for the future, or for an unfavourable season, and it consequently happens that when such a calamity does befall the land, the ryot is helpless and quite unprepared to meet it. It is at such times that the cattle die off in thousands for the want of wholesome food. In such an emergency, what a God-send silage would prove ! *This* is the remedy. No ryot need have any fear of his cattle suffering *if* he has made some provision in this respect. No matter how contracted the pasture areas become, the cultivator has his remedy in silage. We, however, think that the day is very far yet for *India* to suffer from a contracted pasture area.

THEN as to the 'increasing pressure of population upon the soil.' We fear the subject is not quite understood by those who put forward this statement. The last census showed that the proportion of villages, townships and cities to the area, was 0·52 to each square-mile of territory; that in Bengal, which returned the largest number of villages, &c, the proportion was only 1·59 to the square mile. The three most densely-populated provinces in the empire are Oudh, Bengal, and the North-Provinces, with an average population in each, respectively, of 470, 426, and 400 persons to the square mile ; while the entire population of the country only averaged 182 to the square mile. It will thus be seen that the 'pressure of population on the soil' is not as heavy as some would have it. It must, however, be remembered that it is only in isolated parts of the country that the population at all presses heavily on the land. In illustration of our meaning we may state that, out of a total of 714,707 towns and villages in India, about half the number contained less than 200 inhabitants each. Even in Bengal, (in the feudatory states) there were only 78 persons to the square mile ; while in Bombay (Sindh, British territory) there were only 50 to the square mile, and 21 in the feudatory states. In Rajpootana, where there are immense stretches of untilled land, the population is only 79 to the square mile ; in the Central Provinces it is 117 in British territory and 59 in the feudatory states ; while the Punjab has 176 in the former and 108 in the latter. We have been at the pains of quoting these figures to show that the pressure of population on the soil is anything but what it ought to be, and far from being severe. We entirely agree with the *C. and M. Gazette* in thinking that "the individual claim to bring poor land under bad cultivation should give way to the consideration of the general welfare, involved in the encouragement of breeding of plough-cattle, without which agriculture becomes impossible ;" and that "we should not fold our hands on the plea of the inexpediency of interference." To our mind, so far as the maintenance of agricultural cattle in India is concerned, ensilage is the great remedy.

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MR. CHARLES MARIES, of the Durbhunga Raj, has sent us a specimen of Rhea fibre manufactured under his newly discovered process. The fibre is soft, silky, and clean, although Mr. Maries says, "it is only a bit of refuse, not picked out.' He adds further that he has now got over all difficulties, and can turn out the fibre in a much simpler way than that described by Mr. A. Sansone, Director of the School of Dying in the Manchester Technical College, in an article reproduced by us last week from *Bradstreet's*. This is a very important step gained by Mr. Maries, and one which will, we hope, solve the Rhea difficulty in India We are, of course, not aware what method Mr. Maries adopts in stripping the fibre from the stem—whether by hand or machine, or the cost at which it is done ; but we have his assurance that it is of the simplest kind, and very cheap. We would suggest some of our large textile firms putting themselves in communication with Mr. Maries with the object of coming to some arrangement to work up the Rhea on a large scale. Messrs. Ewing & Co. have so far taken the initiative of inviting tenders for the supply of the stems. We have little doubt that Rhea is destined to mark an epoch in the textile industry of this country ; and if Mr. Maries' process proves to be all he claims for it, quite a revolution may be expected in the fibre trade at no distant date. Any of our readers wishing to inspect the specimen of fibre sent to us by Mr. Maries, may do so by calling at the office any time between 10 A.M. and 5 P.M.

WE publish in another column the final report on the prospects of the wheat crop in the Punjab for the current season, from which it will be seen that the area under this cereal has diminished by over one million acres, or 15 per cent. while the outturn of the grain falls short by considerably over nine million cwts., or 25 per cent., as compared with the figures of the previous year. This is a very unsatisfactory condition of things, but the unfavourable character of the season is responsible for it. The redeeming feature of the report is that the yield, where the early mature crop has been harvested, has been extremely good, the grain being plump, heavy, and of good quality. The average yield per acre is estimated at 9 bushels of 63 lbs per acre. We are not prepared to accept this latter as strictly accurate, as it is rarely we have known wheat in this country to weigh more than 56 lbs per bushel. Prices in May last, as compared with the previous year, were decidedly high throughout the Punjab, except in Mooltan, where there was very little change. The crop of the whole Province, at an average of 17 seers per rupee, is valued at 10 crores of rupees. The figures relating to 'comparative rates per rupee in seers

purchaseable in the markets of Amritsar,Karachi, and London, are not quite clear to us. It is surely not intended to be understood that, while Indian wheat can be purchased at the two first-named places at 19 and 18 seers per rupee, respectively, it can be had in London at *103 seers per rupee!* This point requires to be cleared up. The great falling off in the exportation of wheat from the port of Karachi,noticed by us a little time back, is ascribed to the absence of supplies more than to high prices. The stocks of wheat in the Punjab are believed to have fallen very low before the present harvest.

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From the last printed proceedings of the local Agri-Horticultural Society we learn that Mr. J. Cleghorn presented two very suggestive trays of the mulberry silk cocoon, both about one-sixth of the size in ordinary use by cultivators. One, he says, is a sample of the method by which worms are forced to spin their cocoons in one and a half days instead of the usual three or four. They are placed in the trays in the sun under light shading, and this exposure causes the worms to spin their cocoons as rapidly as possible, to protect their tender bodies. This plan forces diseased and sick worms, which might not otherwise have spun, to form cocoons, the quality of which is naturally inferior. The second rearing tray was kept in the rearing room, with the result that there is about 50 per cent loss and much waste silk. Some interesting specimens of silk were also sent by Mr. Dumaine from Hazareebagh. The silk is of a very fine substance and is not formed into a cocoon, but is more like a piece of fine gauze. Mr. Dumaine writes in reference to it :—" In this town there are a great number of *cedrela toona* trees, and on many of them is found what I think is called the spider-silk. However, whatever the name may be, it appears to be made by a kind of *Theophilia.* Under some trees up to a yard all round, is on the ground a gauze-like net work, which also is round the trunk of the tree and on its branches, but in no place touches the leaves. Right against the bark, under this gauze-like net, are a quantity of *larvæ* which when young are brick red in colour, and when the have obtained their full growth, seem to be slaty blue, with rows of black spots on each segment ; and when about to form their cocoons they are deep Prussian blue, about 1 inch by 3/16", the head always remaining black ; they are exceedingly active. In the crevices of the bark are literally studded small white cocoons about ⅞ × ½ inch; the moth resembles much the *Theophilia Bengulensis*,dark grey coloured wings,The *larvæ* seem to have very sharp mouths. I put a few of them in a small-mouthed bottle and many commenced spinning. At first their webs and subsequently their cocoons, while others cut through a cork ½ inch thick and came out of the bottle." Mr. Cotes identifies the moth as closely allied to, if not actually, *Magiria Rubusta* of Moore.

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We have received a little book on *Pisciculture** by Baboo Nidhiram Mookerjee. The author has made the subject a study for some years, and has been carrying out a series of experiments on his own estate at Belghurria,where he has established a fish-farm, and his work will therefore commend itself to all interested in the subject as the result of practical experience. The book itself is printed in the Bengalee character, and is divided into five chapters.. The first deals with the fish supply of Bengal, and points out that except at certain seasons the supply is not equal to the demand. When there is an abundance, it is due,he says, to the extensive capture of breeding and undeveloped fish. The second treats of the food of fish, and the third as to the manner of hatching and breeding, the fourth discusses the fish-trade. The author has ascertained by experiments on his farm, that the trade is a very lucrative one, requiring but little capital. He quotes a statement made by professor Huxley at the last Fisheries Exhibition, that " once in a year, an acre of good land will produce a ton of corn, or two or three cwts. of meat, or cheese, while an acre of sea-bottom (water) in the best fishing grounds yields a greater weight of fish every week in the year." The author, therefore, recommends pisciculture to the serious consideration of his countrymen, as a profitable industry, instead of wasting their time and energy in seeking petty Government appointments. The last chapter deals with the scientific description and classification of fishes, with the names of hundreds of varieties, and their Bengalee equivalents. Altogether, the work is a very useful one, while the subject is one of great economic importance, especially in Bengal, where fish enters largely into the dietary of the people. The author deserves every encouragement in his attempt to bring to the notice of his countrymen an industry with large possibilities, and we recommend the book to all interested in the subject.

* *Pisciculture (Matish Chas).* By Nidhiram Mookerjee *Bangabasi* Press, 34-1, Colootolla-street, Calcutta.

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We reproduce in another column a highly interesting paper on the Indian tea trade, read before the Society of Arts by Mr J. Berry White. Mr. White shows many things ; among others,that in April last the Indian deliveries in London actually assumed the lead over the Chinese product, the figures having reached 13,585,000 lbs, or 51 per cent. of the whole. In this connection the *Pioneer*, in noticing Mr. White's paper, very pertinently remarks : "Had Mr.White glanced at the history of Indian tea in markets nearer the seat of production—in India itself, in Afghanistan, or in Australia—his tale would not have been so flattering ; but it is certainly a matter for congratulation that so great an advance has been made in what is for the present at least the greatest market in the world. It is extremely satisfactory to have the assurance that Indian planters have been able to reduce the price of tea every year, for the last ten years,owing to a decrease in the cost of production, and that the dividends of all well-managed companies averaged 9 per cent for that period. Still more gratifying is it to hear Mr. White declare that this cheapening of the cost of production is by no means at an end, and anticipate that Indian tea, which is now placed in the London market at a fraction over 9d., will be deposited there in 1890 at a fraction under 6d. One question suggests itself. When it is possible for planters to put their best tea down in Mincing Lane at such an astonishingly low figure, why is it that decent Indian tea is so dear here? Perhaps the new Indian Tea Supply Company, just started in Calcutta, will look into the matter." This is exactly the question that has suggested itself to us for some years past, and an answer to which we have sought for in vain. We can understand the natural reluctance of the tea trade to avow the blindness that has characterised their efforts to seek for fresh markets abroad,while utterly neglecting to develop such an extensive market at their very doors ; the question, however, has to some extent been answered by the formation of the new Indian Tea Supply Company.

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Mr J. H. Steel, principal of the Bombay Veterinary College, delivered a few days back, an interesting address to the students on the work of the past, and the prospects of the current year. The address embraced many subjects, and was listened to with great interest. Mr Steel expressed satisfaction that the Governments of India and the Presidencies are giving serious consideration to the valuable system of anthrax inoculation introduced by Pasteur. One method of conveying anthrax and rinderpest was touched on as the most serious to the world in general. The fact that this special poison can be conveyed by dried hides, horns and hoofs from one side of the world to the other, *e.g.*, when a Liverpool carrier dies from a scratch on his neck inflicted by a dried Indian hide, he affords a sad illustration of the necessity for repression of cattle disease in India, even to people living thousands of miles away. Among the disorders conveyed from one animal to another, or from animals to mankind, not the least formidable are those due to animal parasites. On this subject Mr. Steel remarks :—" Certainly formidable animal parasites are extemely frequent' in this country, and it must be remembered that tapeworm in mankind is due to organisms which develop in lower animals. I have evidence of the detection of Cystic Beef, *i.e*, beef capable of inducing tapeworm in men fed on it, if imperfectly cooked, both in Bombay and in Poona. Thorough destruction of parasites and of parasite-infested cases is necessary for lessening the prevalence of disorders of animals and mankind due to them, and the disposal of diseased carcases in general is one, which in the future must receive careful attention from Government and the veterinary profession in India.

Amongst the students are representatives from the Central Provinces, the Berars, Kolhapore, Sangli, and other Native States, and the hope is expressed that other states will follow suit, and that eventually it will be as widely recognised in India as it already is in England, and on the Continent, that it is economical to repress disease among the lower animals. Alluding to the postponement of the projected Calcutta Veterinary College, the lecturer says :—" The Bengal Government sadly feels the want of veterinary practitioners, and yet on financial grounds has been compelled to postpone establishing a college." It was pointed out to the students that something wanting here involved in the question of handling of animals is that of practical horsemanship. " You should all know how to ride and how to take care of your horse; no amount of mere theory will do here. You must avail yourselves of every opportunity of studying horsemanship practically. I regret we have as yet no riding school here." At the first professional examination held at the college last month, out of 43 candidates 34 have been successful, and now become second-year students. Sir Dinshaw Manockjee Petit, already a liberal benefactor to the college, has sent up two free students. Here is an example some of our Bengal millionaires might follow, and thus take the initiative in opening up a new profession for their fellow-countrymen.

ABOUT ENSILAGE.

Almost every week brings us fresh testimony as to the value of ensilage to the farmer. We do not mean to let this matter drop out of sight, as our convictions are strong that silage is the ' one thing needful ' for this country. There are some well known authorities on agriculture in England and the United States who have held aloof from the ensilage agitation, believing that the system, or rather its alleged value, has been greatly exaggerated. One of these sceptics was Professor W. H. Henry, of the Wisconsin Agricultural Experiment Station and College, who has now, we are glad to say, been completely converted and who in a paper to the Chicago *Farmers' Review* (which we have reproduced in another column), gives his experiences with silage, with the object of " soundly converting a few score at least * * by showing the reasonableness of this method of storing stock-food for further consumption." A perusal of Professor Henry's paper will disclose to our readers, among other matters, a new method of constructing silos and pitting fodder.

Hitherto, it has been the practice to pit the fodder in its green, succulent state, under the belief that unless this was done, the result would be more or less a failure. An accident disclosed to the Professor that much better silage is made by ' wilting,' *i.e.* allowing the grass or corn stalks to dry a little, so as to evaporate some of the moisture contained in the green, succulent stems. This is a great advance, as it gives the siloist time to gather in his crop without hurrying over it, and possesses other advantages over the old system. Professor Henry tells us all about the matter, and we refer our readers to his paper.

Another economical method of making silage which is also a great advance over the older system, has been discovered by Mr. John Bevan, of Elton House, Knocklong, county Limerick, who writes to the *North British Agriculturist* as follows :—

" Farmers do not yet realise the benefit and advantage of cheap silage. Hitherto silage has been above the reach of any but extensive farmers. On the system of which I am the pioneer, it is within the reach of the poorest crofter. Formerly it was made in small quantity, but by the system I will describe it is made in any sized stack and in any quantity."

He then proceeds to describe his system in the following terms:—

Last autumn I put together over 200 tons of silage grass off a very weighty rich meadow, in the wettest weather, and with the aid of a water ballast roller I got from Pearson, of Wolverhampton, with this roller and a few boards laid on the grass, layer after layer I built up a stack about 20 feet high. I never had more than two men on the stack, who rolled the wet grass as brought in; they moved the boards, and so quick did the work go on, that they had plenty of time to take an occasional smoke. Some hundreds of gentlemen, farmers and stewards, came here from all parts of Ireland, and can bear testimony that I do not exaggerate when I write this. There were no props to the sides, and no bulging out. The whole cost was £7. I fed over fifty head of heifers and bullocks on one field all the winter (never inside), and they throve well on it, though this was a very wet winter, with snow occasionally, and the field so wet that it was often difficult to get a dry place to put the loads on. My working horses eat it greedily ; in fact all cattle will thrive, and leave the best hay for it. I am sure sheep would thrive well on it ; but my land is rich, heavy, and wet, so I do not keep any sheep. From what I saw of the change made by fermentation in green food, I believe every sort of weed and grass on a farm will make good food for cattle—bracken, rushes, flag-grass ; the latter cattle seem to relish most."

Mr. Bevan further adds that he had no waste and no trouble, and feels sure that his method will revolutionize silage-making. Many visitors went to see Mr. Bevan's silo. He says :—

" Many of the people who came had used other sorts of pressure—that I saw in the papers ; and others made silage by trampling with horses and men, and earth and stones on top, &c ; but when reading of all these kinds of pressure, even stones and earth, people do not realise the difficulty and expense of handling earth or stones. This roller is portable from stack to stack when you let off the water, and the weight is such when at work that it presses every layer of grass into a pancake. When I say two men did the work, of course I don't mean pitching on to stack. Hay saving in wet weather is expensive ; silage is best in wet weather. In the Highlands, where I am sure oats do not ripen, they could be turned into silage and make more money than if allowed to ripen and seed. It need not be cut with a chaff-cutter, but as cut from the scythe, carted to, stacked and rolled "

The Editor of the *N. B. Agriculturist* adds a foot-note to the effect that Mr. Bevan sent him " two different samples of his silage, both of which appear to be exceedingly well preserved, and about the most edible-looking silage we have yet seen." We will conclude by quoting some important questions and answers by Mr. John Gould, a noted American authority, on ensilage.

1. " Is it necessary for the silo to be set in the ground like a cellar ?" No. The above-ground silo is now regarded as the best. The pit is more expensive to build and to feed out of. Above ground, it is cheaper to hoist the cut fodder by means of a carrier, than to lift it up out of a pit when feeding. Above ground, the drainage question is settled.

2. " Will ensilage freeze in winter, and if so, how best guarded against ?" It will not freeze even in severest weather. The usual temperature of a 50-ton pit is about 80 degrees. If the silo is of wood, the air space between the studying is all the protection needed. Sawdust filled in here draws moisture and hastens decay of timber and boards, and is of no use in the way of protection. A strip of tarred paper under outside boarding is cheaper and better than sawdust. Warm air rising from the silo keeps the surface from freezing.

3. "Does ensilage need heavy weighing to preserve it ?" No. Slow settling and heating causes it to settle compactly by its own weight. Then all that is needed is to put on an air-tight cover and weight enough to hold it down in its place. Tar paper —all lapped and covered with one thickness of inch boards, and a load or two of hay on top, or even six inches of sawdust, is enough.

4. "Can clover be successfully ensilaged ?" Usually it can, but there is a little conflict of opinion as to whether it should be cut up or not before going into the pit. If put in long it is apt to cling to the sides and not settle as solidly on outside as in centre. If cut up it settles uniformly and requires less weighting. J. W Everett of Westerville, Ohio, filled a large silo with clover last year, with most satisfactory result. F. Morrison, of Cardon, Ohio, has ensilaged clover for two years, and regard it the best way.

5. "How much seed corn per acre for best results ?" About 15 quarts in drills 3½ feet apart. It should be thin enough, so the stalks will attempt to produce ears. The difference in feeding value of sowed corn (3 bushels per acre) and that produced by 12 quarts seed per acre, is as 11 to 28, and the latter produces most weight.

6. "What is a day's ration for each animal ?" For dairy cows, not far from 50 pounds. Ensilage made from corn grown as above makes a strong food, and a cow will not need more than six or eight pounds of bran additional for a good milk ration.

7. "What is the cost of putting up ensilage ?" An average drawn from the expense account of six of the most extensive silo men I know, made the cost of the whole crop, cutting and all, \$ 1·50 a ton; cutting and filling 15 to 65 cents per ton. Handiness makes economy in expense. This puts the feeding value of hay at about \$4 per ton, but as ensilage and bran will make a cow give 25 per cent more milk than hay, corn and oatmeal, the ensilage is entitled to so much more credit.

WHEAT CROP OF THE PUNJAB, 1887.

We are indebted to the Revenue and Agricultural Department of the Government of India for the following final report on the prospects of the wheat crop of the Punjab for the current season, dated June, 20,1887 :—

The season.—In the submontane districts, and in most of the districts immediately adjoining, from Hazara to Amballa, the sowings were exceptionally favourable, owing to an abundant fall of rain in October. This fall did not extend to any of the districts in the south-west Punjab, and those in the south and south-east obtained only a small amount. After the sowings the weather was most unfavourable. The winter and spring rains failed completely in the central and south-western districts. The only districts that received any rain to speak of, were those immediately adjoining the hills—Loodhiana, Delhi, and Goorgaon. Very great and general damage was done by the severe frosts of January and February, and in some districts early hot dry winds completed the ruin of the unirrigated wheat. Even the canals were closed for a longer period than usual in this unusually dry year. On the other hand, in spite of the rates of yield that have been reported, it is believed that the yield where a fairly well matured crop has been harvested, has been extremely good. This is the case more especially with irrigated crops. The grain is plump, heavy, and of good quality Harvesting, threshing and winnowing were finished in most favourable weather

The area.—The area under wheat for this harvest is returned at 5,943, 400 acres, as compared with 6 970,600 acres for last year. The diminution is 1,027,200 acres, or 15 per cent. This is the area returned after deductions on account of areas on which the crop failed ; and there is no doubt that the area sown was very nearly equal to the area under wheat last year. The area estimated at the end of January was put at 6,900,200 acres.

Yield.—With so unfavourable a season a poor outturn could only be expected. However well the wheat in the submontane districts and on irrigated lands might yield, there was a very large area of poor stunted crops, on which the outturn could only be very low. The total yield, according to the returns received, is estimated at 27,238,305 cwt, As compared with the yield of last year there is a falling off of 9,178,385 cwt., or 25 per cent. But there is little doubt that the system in accordance with which these estimates are framed has a tendency in bad years to under-estimate the actual yield for the area returned as cropped. It is believed that an estimate of 1,700,000,000 seers, or 30,357,112 cwt, would be a nearer approximation to the actual yield than the one recorded. This would raise the average yield per acre to 286 seers, as against 293 seers last year, equal to 9 bushels of 63lb per acre.

Prices.—The wholesale rates for wheat at the chief marts in the province on the 15th and 31st May, are shown below, and compared with prices in 1886 :—

Price in seers per rupee prevailing.

Mart.			15th May 1886.	15th May 1887.	31st May 1886.	31st May 1887.
Delhi	...	...	21	17	2[illegible]	17
Ferozepore	...	...	20	17	1[illegible]	17
Mooltan	...	...	16	15	15	15
Lahore	...	...	20	19	[illegible]	19
Amritsar	...	...	21	19	[illegible]	19
Peshawar	...	...	21	14	[illegible]3	15

Taking the average price at 17 seers per rupee, the wheat crop of the Punjab of 1887 is worth Rs. 8,97,26,182, or if the outturn is increased as noted above, Rs. 10,00,00,000. The following rates, obtaining at Calcutta and Karachi during May, have been taken from the Chamber of Commerce publications :—

Price in seers per rupee prevailing

		10th May.	17th May.	21st May.	28th May.
Karachi	...	13	13	13	13
Calcutta	...	14	14	14	14

The English papers of the last mail contain the following information as to the price of wheat. The Board of Trade return for the week ending 7th May, gives 33s. 2d as the average price of wheat. The Mark Lane's quotations for 9th May, are as follows :—

				Shillings.
British wheat, red, 504 lb	...	...	...	28 to 35
Calcutta ,, ,, 486 ,,	...	...	...	32 ,, 34
Bombay ,, ,, ,, ,,	...	...	...	33 ,, 36
Karachi ,, ,, ,, ,,	...	...	...	31 ,, 33

Assuming 32s, per 486lb to be the price Punjab wheat fetches in London, and taking the rate of exchange at 1s 5d, we get the following comparative rates per rupee in seers :—

Amritsar	...	...	...	...	... 19
Karachi	...	...	...	...	... 18
London	...	...	...	...	(*sic*) 108

or, in other words, the relative qualities of wheat which the same amount of money will purchase in the three markets are 100, 68 4, and 56·8. Even present high prices do not apparently check exportation. It is believed that very large purchases of wheat and oil seeds are now being made. The great falling off in exportation from Karachi seems to have been due to absence of supplies, more than to high prices, although the margin between Karachi and London prices for wheat does not seem sufficient to allow of much profit. It must be remembered that most of the wheat exported from Karachi is bought up-country. There is reason to believe that stocks of wheat in the Punjab had fallen very low before this harvest.

THE FRUIT INDUSTRY OF INDIA.

We attempted in a previous article to draw attention to this subject. The *Civil and Military Gazette*, we are glad to see, is agitating the matter in connection with the transport of fresh fish and game. Our contemporary says :—

It is a good sign that the question of transporting fresh fish, fruit, and game over long distances by rail in India, is once more coming to the front. Some years ago a patent car, built by the Swansea Wagon Company, was tried on an Indian line ; and failed for two reasons. Ice was dear ; and the coolies who had to handle the complicated car, were stupid Now, however, ice is cheap, and though the coolies have not been "levelled up" to understand complicated machinery, the latter has been levelled down to the lowness of their comprehension. In fact, we think that the time has arrived when another trial of the car might be made, with assured success. We do not say that Calcutta aspirations for the "splendid fruits of the Punjab" for breakfast will be literally verified. But this country where, more than in any other, Europeans accustomed to the comforts of English house-keeping, wage an unequal warfare with the putrifying sun, the wily khansama and the villainous cook, is surely the place where fresh fruit, fresh fish, and fresh game from distant districts would be the greatest god-send. Yet, though England, Great Britain and the Colonies, who suffer infinitely less, have the system in working order, we, in the Punjab, cannot even ensure the arrival in good condition of fruit from Saharunpur, to say nothing of fish and oysters from Kurrachee, or game from outlying stations. We shall still have to wait probably, until Calcutta or Bombay have proved the system a success, before we even begin to think of trying the experiment.

It is the want of proper transport that has, we believe, interfered so much with the development of the fruit industry in India. A visit to Mandvi or Palampore in the Punjab will convince any one of the great possibilities of an extensive fruit trade that exist in these and other places in and around those regions. We have seen apples, pears, apricots and peaches of really fine quality literally *rotting* under the trees for want of a market. Passing a private garden in Mandvi some time ago, we were tempted once to pluck a few apples from a branch that overhung the wall on to the road, but we were seen by the owner, who came up and said that the fruit of that particular tree was not very good, but that there were others with much better fruit, and invited us to pluck as many as we wanted, *free, of charge* ! This surprised us somewhat, and a few questions led to the disclosure that owing to the want of a proper market, immense quantities of fruit simply rotted under the trees, and rather than see them wasted, the owners of orchards never interfered with any one who felt inclined to partake of them *free of charge*. We were not many days in Mandvi, but we had ample opportunities of

forming a very fair idea of the possibility of developing an extensive trade in fruit.

The importance of fruits as a diet is not, we fear, sufficiently recognised in this country, where it is most necessary for the preservation of health. The development of an extensive trade in fruit is one which we think well worth considering. In other countries matters are not allowed to slide as in India. Even in Jamaica, the export value of the trade in fruit alone amounted to £252,836 in 1884. This result is not, however, considered at all satisfactory, if we are to judge from the following extract from a prize essay by Mr. W. B. Espent, F.L.S., on the "most effective and practical means of ameliorating and extending the agricultural capabilities of Jamaica":

"I have left the fruit industry to the last, because I think it is destined to be the greatest of all Jamaica's sources of wealth. When we remember that within four or five days' steaming there is the United States, with over fifty millions of the most intelligent and active of mankind, it is astonishing how little we have done to make the most of our advantages. The fruit industry has grown from nothing without any aid or encouragement from Government. From an export value in 1873 of only £4,745, it increased to £252,836 in 1884! Fifty fold in the eleven years. There is no reason why it should not grow another fifty fold in the next eleven years, if the requisite facilities are furnished. But no further material increase can be expected unless railways or tramways, or wire ropeways, are constructed, to provide transport for the fruit; the labour and land, available now, cannot be expected to accomplish impossibilities; and there is no doubt that the trade has encroached on the means now available, and that much valuable fruit is destroyed, or rendered unsuitable for shipment, owing to the long distances that have to be overcome, in the transport, on men's and women's heads, and on mule and horseback, and in carts and in boats, before it finally arrives on the steamers' decks. Whilst Costa Rica, Honduras, and even St. Domingo are busy building railways to transport their fruit, Jamaica hangs back, because some people are afraid that an industry which has reached a quarter of a million sterling in a dozen years, in face of immense difficulties, will not endure and increase sufficiently to render railways remunerative. Others are afraid of increasing our paltry Public Debt in order to obtain so beneficial an investment for their money. The table annexed, marked A, shows the debt, per head of population, in each of the countries named. It shows that Jamaica has a wide margin for investing money in railways, and that we are far behind in this most needed direction. We are being left behind rapidly in the race for wealth, because we go on carrying on our heads burdens which in other countries are carried by rails. It is a wonder that we do not realise the amount of labour—human and animal—which is now daily wasted in performing duty in the transportation of fruit which could be much more cheaply performed by steam, with the greater advantage, too, that the labour saved by railway would be available for increasing the quantity of our exports instead of, as now, reducing their money value. So long as Jamaica refrains from building railways for the encouragement of the fruit and other industries, because it will be necessary to raise money by loans to pay the cost, so long I say we are acting what the wicked servant in the Parable did, who, instead of putting out to interest his master's money, hid it in a napkin. I cannot understand the theory which prevents the colony borrowing funds, which can be invested to advantage, and to postpone further railway construction until we ascertain the results, from a pecuniary point of view of the recent puny railway extension, is, I think to confess that we are not able to understand the position of the island, and of its only advancing industry. For want of railways, much of our fruit leaves our shores stale, bruised, and battered—our planters are deterred from extending their cultivation by the risk which now attends the shipment and transport of their fruit, and many thousands of tons of energy are wasted in conveying instead of being well-spent in producing the article. Our fruit is admittedly the finest flavoured and the best reaping which reaches America, but, for want of railways, it is shipped when stale and is bruised in transport. The only article for which there is any demand is grown and exported under difficulties, which no good Government would permit to continue when the remedy is so easily applied. It comes to this that because Jamaica is Jamaica, that which is beneficial and sound policy elsewhere is bad and unsound here. Are we to allow such a monstrous idea to prevail to our injury? In order to ameliorate and extend the fruit industry it is essential that railways or tramways, or wire ropeways, should be constructed in districts possessing no certain or sufficient means of transport. Let this be once recognised, and we shall get railways. Let this continue to be ignored, and we shall not get railways. Let this continue to be ignored, and we shall lose our fruit trade, as we have lost our sugar and coffee trades. It is also essential that fruit should be included among the articles enumerated in the schedule of the 'Agricultural Produce Buyers' Law." Until this is done the grower of fruit must remain at the mercy of petty thieves; and petty larceny bears more cruelly on fruit-growers than on any other class of the community.

We should like to see a similar essay relating to India. The Government might offer such a prize with much advantage. It will be seen from the above what importance Mr. Espent attaches to the fruit industry of Jamaica. How much more important is such an industry to India? We should like to see this question thoroughly taken up and discussed.

Miscellaneous Items.

RICH gold mines have been found in Eastern Siberia, some few hundred miles from Yakutsk, extending over a district hitherto unexplored. Report declares that the region is a perfect New California in its greatest days of gold diggings.

THE construction of certain buildings which the recent Committee considers necessary for the Lahore Veterinary School is under the consideration of Government. The retention of the services of Inspecting Veterinary Surgeon S. Kettlewell, of the Lahore Veterinery College, who would otherwise retire under the 558-years rule, has been sanctioned up to the end of October 1888.

A NOTICEABLE feature in the trade returns is the large increase in the employment of aniline dyes in India in place of the indigenous colours formerly employed for its woollen yarns, silk, and cottons. The value of the imports now averages £100,000 a year. The influence of aniline dyes has been more destructive to the tinctorial and textile industries of India than is commonly supposed. These cheap colours suit the tastes of the people, but have demoralized, their indigenous industries. The soft, delicate, and harmonious colours which formerly characterized Indian fabrics have given place to more showy tints; and coincident with this degeneration, the reputation for durability formerly enjoyed by Indian dye-stuffs has been destroyed.

THE Spanish Government seems determined to do its best to develop the trade and productive resources of the Phillipine Islands. The Ministry for the Colonies at Madrid has announced his intention to open a port on the Pacific coast of Luzon, conveniently situated at a place of call for vessels using the Panama route. The harbour works at Manilla are also to be pushed on so as to furnish increased accommodation, and arrangements are to be carried out for thoroughly lighting and buoying the Philippine coast. A cable is also to be laid between Manilla and Visayas Islands, where trade is rapidly increasing. To encourage the sugar planters, who have lately been incurring serious losses, the Spanish Government has sanctioned the reduction of the export duty on sugar by 20 per cent, an announcement which have been received with gratitude.

THE *Produce Markets' Review* writes:—The heavy loss to the Treasury arising from the present system of charging the sugar duty on the roots instead of on the manufactured article, is now increased by further loss arising from the excessive drawback allowed on the exportation of refined sugar. The raw sugar used by the refiners yields from 90 to 92 per cent. of refined sugar, and as the duty paid by the refiner on his raw sugar is 9 m. per cent, it is clear that the drawback on refined ought not to exceed 10 m. It is at present 11·10 m., and therefore the refiner receives, and the revenue loses, 1·10 m. (about 1*s.* 1*d.*) for every cwt. of refined sugar exported. This loss will be increased when the new duties and drawbacks come into operation in October. The duty on raw will then be 8·625 m. per cwt. The drawback on refined ought therefore not to exceed 9·50 m. per cwt. It will, however, be 10·75 m. The refiner will then gain, and the revenue lose, 1·25 m. (about 1*s.* 1*d*). on every cwt. of refined sugar exported. This amounts, on the average yearly exportation of refined sugar, which now exceeds 100,000 tons, to 2,500,000 m.—(£125,000.) This loss is in addition to that arising from the system of levying the duty on the roots, and it does not, as in that case, benefit the agricultural interest.

Selections.

THE INDIAN TEA INDUSTRY.

At a meeting of the Indian Section of the society of Arts, Adelphi, London, held under the presidency of Sir Roper Lethbridge, M.P., on the 27th May, Mr. J. Berry White (late of Bengal Medical Service) read a paper on the Indian Tea Industry: its rise, progress during fifty years, and prospects, considered from a commercial point of view." In the course of his remarks Mr. White said :—

The first experimental plantation in Assam was commenced at the latter end of 1835, but a more successful attempt was made in 1837. The annexation of Upper Assam, in 1839, made private enterprise safe and possible, and a few months afterwards saw the formation of the Assam Company, to whom the Government made over all its experimental plantations, excepting Chabwa. At the outset, the Assam Company was not much more successful than the Government had been, the mistakes it committed were, if possible, more egregious, and in a few years it had expended its entire capital—£200,000, and was practically bankrupt. The tide then turned, profits at last flowed in ; it paid its first dividend out of earnings in 1852, and the Company has how for many years, with the exception of two or three disastrous, or panic seasons, realised splendid profits, having divided among its shareholders over a million sterling, and its property is now worth, valued by the selling-price of its shares this month, nearly half a-million. For the first decade after its formation, the Assam Company held a virtual monopoly of tea cultivation in India, but in 1853 there were nine private gardens in Upper Assam, and in the following year gardens were opened out in Lower and Central Assam, and in 1855 the first gardens were commenced in Cachar and Sylhet ; in these districts indigenous plants had also been found extensively. So far, I have not referred to districts beyond Assam. Tea cultivation has, however, made considerable progress in some parts of Bengal, the North West Provinces, the Punjab and Madras. But it is in Assam alone, with the adjoining districts of Darjeeling and the Dooars, that the cultivation possesses any real commercial importance. During the four years following 1858, cultivation extended rapidly in every district of the province, excepting Goalpara. The conspicuous success of the Assam and Jorehaut companies led, in 1862-63-64 to a period of wild excitement and speculation ; clearances were made without any provision for labour to keep them in cultivation; companies were formed almost daily in Calcutta, and the shares were eagerly applied for and rapidly rose to high premium. The mania extended to Government officers and their subordinates, three deputy commissioners, four assistant commissioners, and several police officers, threw up their appointments to engage in tea planting, and in the subordinate grades there was such a general exodus from official employment, that business in many of the public offices was brought to a dead lock. The inevitable reaction and collapse followed rapidly, setting in at the latter end of 1864 : the climax of panic was reached in 1866, when most of the companies, formed during the mania, disappeared.

Since then the industry in India had made steady and generally healthy progress. The first sample reached England in 1837; in 1838 the first importation of Indian tea, as an article of commerce, was made, and amounted to 488lbs. It was sold by public auction in Mincing-lane, the average price realised for it being 19s. per lb. The crop of 1839 consisted of 95 cases, and averaged 8s. From 1840 the quantities steadily, but gradually, increased, until 1855, when it rose to nearly a quarter million lbs.; while in 1886 it amounted to no less than 76,585,000lbs. In 1887, the crop is estimated by the Indian Tea Association of Calcutta, from returns they have been able to collect, at 86,031,000lbs. But as the Association do not receive returns from every garden, these estimates are nearly always short of the actuals—last year (1886) by nearly 5,000,000lbs. It is, therefore, safe to estimate that the actual production of Indian tea during the current season, will not fall short of 90,000,000lbs, of which about 82,000,000lbs are likely to be exported to this country.

The quantity retained in India for local consumption including the army commissariat requirements, and the quantity exported across the frontier to Afghanistan and Central Asia, has been returned for many years past at 1,500,000lbs. This is manifestly incorrect, and the actual consumption of India itself must be far greater, but there is no way of ascertaining even approximately accurate figures. The 1,500.000lbs, estimate now given has been the same for some years past, the increased European and Eurasian population alone must have caused an increase during the past lustrum, without taking into account the steadily growing taste for tea drinking among all classes of the 200,000,000 of native races in India. The percentage of Indian tea (in which is included Ceylon) taken for home consumption in the United Kingdom, exhibited even more forcibly than the import of statistics, the steady growth in public favour of the Indian, and the rapid displacement of the Chinese, staple.

A stern chase is proverbially a long one. It has taken fifty years to get on level terms with our great rival. The first quarter of the current year has seen this, while last month (April, 1887) we have actually assumed the lead, the deliveries for home consumption for the month being 13,585,000 lbs., of which India and Ceylon furnished 7,428,000lbs., or 51 per cent of the whole. A truly memorable month in the history of the enterprise. This great industry, for so it may now be designated without question, employs over 500,000 of our Indian fellow-subjects, either directly, or in subsidiary enterprises dependent on it, over 12 lakhs of rupees being paid to them in monthly wages. About 275,000 acres were under cultivation at the close of last year, a considerable portion of this area being immature plant ; the whole, when in full bearing, it is estimated, will yield 120,000 000 lbs. of tea ; about £19,000,000 sterling is invested in the enterprise. The market value of the current year's crops (90,000,000lbs.) may be roughly estimated at £4,500,000. I have endeavoured to show how the great reduction in outlay of 7½*d*, per lb. in ten years, has been brought about, and I believe that these factors are still tending towards the same end, but more rapidly than in the past, and I look forward with confidence to further reductions of one penny per pound anually, for the next three years, and I venture to predict that if no disturbing cause—not at present foreseen—occurs, the crop of Indian tea of 1890 will be placed upon the London market for a fraction under 6*d*. per lb Before I close this paper, I will very briefly discuss the possibility of an over-production of tea in all countries, with the probability of the disastrous consequences happening to the Indian grower, which in the over-production of wheat and sugar has overtaken the English farmer and the West Indian planter. The consumption of tea of all sorts in the United Kingdom, in quinquennial dates since 1870, has been in lbs :—1870, 117,000,000 ; 1875, 145,000,000 ; 1880, 159,000,000 ; 1885, 187,000,000, showing an average annual increase of four and two-third millions. It is true that this ratio of increase has not been maintained for the last three years, but the explanation given by the Chancellor of the Exchequer is undoubtedly the correct one, —*i. e.*, that the consumption of infused tea has gone on increasing at probably a greater ratio than heretofore, but that the far greater strength of Indian tea has furnished a much larger number of cups of the beverage from the same quantity of leaf used. The annual displacement of China tea for the past three years is shown in the amount taken for home consumption, in lbs. this year, being for eleven months only.—1885, 116,000,000 ; 1886, 100,000,000; 1887, 89,000,000. Assuming that the deliveries of China tea for this month (May) will equal that of last month, this would bring the total consumption for last year to 96,000,000lbs ,in round numbers, showing an average displacement of China tea by about 7,000,000lb. annually, thus providing, with the increased consumption, an outlet for an increase of Indian and Ceylon tea of about 12,000,000lbs. annually, which might take place without any further disturbance in values ; but for the next few years the increased production of India and Ceylon will not be less than 15,000 000lbs annually, so that China must give way in future at a still more rapid pace than hitherto, and this can only be brought about by a still further fall in the values of teas from all countries, and I have attempted to demonstrate how the greatest probable fall can be met by the Indian planter without any diminution of profit.

ENSILAGE AND AGRICULTURAL DEPRESSION.

Sir,—Will you allow me to cordially endorse the opinion and excellent advice expressed by the writer in the article upon the above subject, which appeared in last week's *N. B. Agriculturist*, I hope the practical suggestions he offers for the relief of the serious and almost universally existing agricultural depression, may receive the consideration they merit, both from landlords and tenants, instead of being hooted down by ignorance and prejudice. I can understand farmers and others, in their crippled financial condition, hesitating to embark upon expensive remedial experiments, the result of which they may think might possibly be only further loss ; but the system in question entails only a small outlay—almost nominal in proportion of its value,—such as not even the poorest among us need fear to encounter, if properly initiated and directed. Experience has now demonstrated that stone or brick silos, so long held to be indispensable to the making of ensilage, are altogether unnecessary, and that, as a rule, better ensilage—*sweet* silage—is obtained when made in stacks, than in the costly erections used as silos. Any one conversant with both methods of making ensilage

well knows that this is no exaggeration, but a simple fact, confirmed last December at the Ensilage Society's Show, by the champion prize being awarded to silage made in a stack.

As it may not be uninteresting to some of your readers to know how I make my ensilage, I will, with your permission, briefly describe the process. To begin with, my essentials consist of two items —a few rough boards and an efficient press. Any sort of wood is suitable for the first. The press I have used for several years—the same as your correspondent recommends— is Blunt's patent, which besides being one of the most moderate in price, has, in my opinion, a great advantage over others, from the pressure being continuous and distributed broad and equal over the whole of the stack, and partial and non-continuous as in many presses of other systems. I make it a rule to observe three maxims—1st the crop must be cut especially if inclined to be hard or reedy, a little before it is ripe, and stacked at once, after cutting; 2nd, in building the stack I have it tramped firm, and solid at the outside by two women, and do not tramp it at all in the centre which should be rather loose; and 3rd, I put continuous pressure of not less than 150 lbs per superficial foot upon the stack' where it remains for not fewer than four months.

Such is the method pursued in my own case—a simple cheap system requiring neither skill nor sunshine to work it satisfactorily, and I have no hesitation in saying; I think there is not a tenant in Scotland who would not find it greatly to his advantage to make at least a certain amount of ensilage; while its adoption altogether in high late districts would largely increase the prosperity, and stock-carrying capacity of the farm. Nor should it be forgotten that while this made of preserving green food may with advantage be adopted—in part at least—on even fertile and early farms, it is just in circumstances the most necessitous and difficult to cope with in severe winters that ensilage best proves its value, and becomes pure gain, *viz.* on high hill pastures. In term's of storm or backward springs when the healthy condition of the flock is vital to stock holders, the addition of silage made from waste grass or bracken, and stacked on the hills in summer, would often affect the saving of hundreds of pounds in a single week, and, as your correspondent states, cost little more than the making.—I am, &c',—THRIFT—in *North British Agriculturist.*

CATTLE AND AGRICULTURE.

The last number of the proceedings of the United Service Institution of India contains M. Hallen's important lecture upon horse breeding. When will it be that some one equally competent shall discuss before an audience equally interested, the far more vital question of cattle breeding? Horse breeding is of great moment to the military interests of the Empire, but of far greater moment is cattle breeding to the financial interests on which those military interests depend. Our revenue system in its tenderness for individual rights is permitting the general welfare of the community to be sacrificed in this particular to a degree which is already keenly felt, and which will be felt more and more as years go by. The price of agricultural cattle has alredy increased in an alarming manner, and the process which causes this is being intensified from day to day. The pasture lands of the villages are being broken up at a pace which has left many districts with hardly any; and the village cattle, other than the plough cattle, are condemned to pick up a precarious existence by grazing over the fallows and over the stubbles after the harvests are reaped. The natural result is a contraction of breeding, and an enhancement of the price of plough cattle which seriously diminishes the margin of profit for the zemindar, and consequently the revenue which he can pay to the Government.

Commerce will not probably be much affected by this. Railways are taking up the main lines of traffic, and it cannot be doubted that, ere long, tramways will take up the feeder roads. The tram will supersede the costly metalled road altogether; for, while costing little more, it makes a return, over and above its cost of maintenance; whereas metalled roads are a permanent burden on the funds of districts. The tram will also take up in time most of the main unmetalled lines of road, immensely reducing the cost of freight thereon, while paying its own way Thus the diminution of draught bullocks will not be much felt by commerce, though it may be very seriously felt by the military department in time of war—so long as the latter fail to maintain i.s own transport. But there is very little hope of any mechanical device coming to the aid of the agricultural operations of the country. These must depend, as hitherto, upon the plough bullock, and with diminution of cattle breeding the price of the plough bullock must gradually become prohibitive.

Why is pasture broken up? Because of the increasing value of the products of cultivation, and because of the increasing pressure of the population upon the soil; both inducing village communities to divide, or to cultivate, without dividing their common land. If the diminution of the area of pasture land were met by improvement of its capabilities, the evil would be greatly modified; but this is not the case. Village common is at any time the poorest of pasture, necessitating a large area per head for, the maintenance of stock. When this is encroached upon, it stands to reason that the best of it is broken up and only, the more worthless tracts left for pasture. If then these are in no way improved but rather deteriorated by overgrazing consequent on diminished area, melancholy indeed becomes the prospect of village cattle-breeding.

Supposing the village common reserved from the plough, what must be the result? Extension of cultivation in the village will have reached its limit somewhat earlier than in the present course of things. That is all. It must reach its limit in any case when all the common land has come under plough. If that is reserved, then the result arrives somewhat earlier. What must follow on extension of cultivation reaching its limit? One consequence must be emigration; the other higher cultivation. Both are in their way desirable consequences, and no object is gained in postponing them, to be compared with the evil resulting from the disappearance of the pastures. That the surplus population should emigrate and bring under cultivation the vast waste areas existing in various parts of India, is eminently for their own advantage and that of the country generally. That the land should be better cultivated is also surely desirable; but if it is to be better cultivated there must be no diminution of the supply of plough cattle.

To reserve what remains of village common without improving it, will serve but little purpose; therefore measures of reservation and measures of improvement must go hand in hand. The example of both must be set by the Government in its own waste lands. If these are reserved for pasture, instead of being let out for cultivation; if they are improved by cultivation of fodder-bearing, grass-protecting trees, and by the substitution of good grasses for existing worthless species, and by protection from over-grazing however immediately remunerative, and by storage and accumulation of fodder supplies—whether in underground or compressed open-air siloes—then an example will be set to the people which will not long remain without result.

We have before us the fact that the price of plough cattle is rapidly rising, and that the breeding of cattle in ordinary agricultural villages is on the decrease. We see that in large tracts of the country the people do not store fodder enough even for the feed of their plough cattle, and that, consequently the practice has arisen of selling these yearly after agricultural operations are over, and buying again when those operations recommence. We see what poor stuff is such fodder as is stored—the stalks of cereals whose strength has been eaten in their grain and desiccated in open-air stacks till no nourishment whatever remains in the fibrous residuum. In the face of these facts we should not fold our hands on the plea of the inexpediency of interference with individual rights. The individual claim to bring poor land under bad cultivation should give way to the consideration of the general-welfare involved in the encouragement of breeding of plough cattle without which agriculture becomes impossible —*Civil and Military Gazette.*

HINTS ON SILO AND ENSILAGE.

BY PROF. W. A. HENRY.

Spring is at hand and if a silo is to be filled next fall corn must be planted soon with that end in view How many readers of the *Review* are contemplating building a silo, I wonder? How many more are half-way inclined, but still have doubts which must be removed, and then they will go forward in the matter? I will guarantee a hundred or more in reply to the first query, and thousands for the second. In this article I propose to soundly convert a few score at least, if these doubting ones, by any amassing of convincing figures, but by showing the reasonableness of this method of storing stock food for further consumption. The writer has fed ensilage for five years, and ...ly has had time to consider the question, and study whe...er or no the silo is a valuable adjunct to our farm buil...

THE SILO OF THE PAST.

In the early days of ensilage, only stone or grout silos were recommended and these were often sunk in the ground like cisterns. These were usually expensive and what is far worse they were the poorest possible receptacles for the purposes intended. The reason for this statement will be evid...t when it is understood that we require in the perfect silo ...o qualities; first, that the walls prevent the passage of air either in or out; second, that the walls be non-conductors of heat. Now with all stone silos built with solid walls, more or less air ente... so that the ensilage close to the walls is sure to ... spoiled and ...rthless. Again stone walls are good conductors of heat, and ...e heat which naturally arises in ensilage, is conveyed from it by contact with these walls, and the ensilage is left in cold winters to freeze inward for six or more inches on all sides next the walls if underground, the ensilage is chilled down and its quality injured, Of course, all stone silos are not equally bad: those with a dead air space might be excellent, even; but in general it may be said that the stone silo is not a success.

THE ENSILAGE OF THE PAST.

Partly from the character of the pit into which it was put, and partly from the character of the material used, much of the ensilage made heretofore was, at best, but very common food for cattle. The whole endeavor of many parties was to grow the greatest possible number of pounds of green fodder corn to the acre, with no regard whatever to its feeding value. Immature cornstalks of mammoth varieties, grown so thick in the field that the sunlight was shut out, were cut and packed away with the idea that ensilage was ensilage, and fifty pounds, or even less, made a ration for a dairy cow. In view of the way it has usually been managed, the wonder is not that ensilage was poor, but that the cattle ate it at all. Are not these statements reasonable, and can the friends or foes of the silo object in any way to them?

THE COMING SILO.

The silo of the future is more economically built than the old one, and is of wood and building paper. It has a dead air space, which seems to hold most of the heat generated, and a layer of paper and boards next the ensilage, which, with the dead air space and the outer layer of boards and paper, shut out the air. With the air entirely shut out and the heat shut in, the silo holds its contents in just the shape desired for successful feeding. Any farmer can see the reasonableness of a silo built of 2 x 10 inch studding, set on a plate of same dimensions, which rests on a stone foundation. Both sides of studding are very carefully covered with tarred paper, having no cracks or breaks, and then boards are placed over the paper; ship lap outside and matched flooring inside. This completes the walls. Any roof will do, and if the floor is slightly raised so water cannot run in, the natural earth is fully as good as one made of grout. For ordinary farms each pit should not be over 12 x 12 feet or 12 x 15 feet at most. Better several small pits by means of partitions than one large one.

THE COMING CROP FOR THE SILO.

Not trashy, watery, yellow cornstalks gorged with thin water, will delight the siloist of the future, but good, honest stalks of corn, each carrying a good " nubbin," if not a full ear, will be required when the silo is expected to hold the maximum amount of stock food. Water is not food in ensilage any more than it is in poor milk, and our farmers will not be long in seeing it.

SLOW FILLING.

On no one point has greater advancement been made than in the method of filling the silo. Each pit should be filled, say two feet deep with the cut cornstalks, and this allowed to heat up to 125 or 130 deg. Farenheit before the next is added. This gives the farmer an abundance of time for the work. And there is not the least need of hurrying as one can be a couple of weeks in filling the silo if he wishes. Five years ago, when the writer first filled a silo, when Saturday came half the afternoon was spent in covering the partly filled pit with boards and weighting with stones. This labor was incurred in full belief that, all would have spoiled by Monday, had the pit been left open. Now one can stop for Sundays, or to go to the fair, or for other farm work, with no expectation of harm, providing a couple of feet of fresh ensilage is added every two or three days.

PERFECTLY GREEN FODDER CORN NOT ESSENTIAL.

The impression is abroad that, ensilage must be made from green unwilted fodder corn, and such has been the source of most of the ensilage of the past, but an accident in our work of filling the silo last fall put us on track of what I believe to be an important advancement. While filling the silo we were afraid of frost, and the men were set to cutting and shocking the fodder corn which we could not at once put into the silo. Later, some of this wilted half cured and shocked fodder corn was put in the silo, directly over fodder corn, which had been put in fresh and unwilted. It was found, that the ensilage from the half cured fodder corn was the best we had, and superior to anything we had ever before had in our five year's experience. This leads me to the

MOST IMPORTANT POINT OF ALL.

I predict that the future silo will contain fodder corn more or less wilted and cured before it is put into the silo. Water is not food in our general understanding of the term, yet succulence in food is a point of considerable importance and quite essential in feeding diary cows. Green fodder corn contains from 80 to 90 per cent of water, and ordinary shocked and dried fodder corn from 25 to 50 per cent matter. Many will doubt there being so much water in shocked fodder corn, as I did, until repeated analyses forced me to accept the fact, I maintain that we can cut and shock the corn, and so get it out of the way of frost; then instead of giving one-eight of the crop for husking, and another eighth to the miller for grinding the grain, we will draw the shocks, corn and all, to the feed-cutter, and pass it through that into the silo. We can put this material in half dried or wholly cured, as circumstances dictate, and at feeding time we will have the finest feed possible to be made, for what can be finer feed than good shock corn cut up, ears and all, kept in the bright condition it is at husking time, in the fall. Farmers who have hogs to feed, and wish to husk part of the shock corn, can do so, and can mix the husked fodder in with the unhusked, thus diluting the strength, if I may so speak, of the rich all corn and fodder part of the silo contents.

In this country of deep snows it is hardly practicable to allow shocks of corn to stand in the fields, until, we may wish them to feed out to stock. To feed economically we must do this, for stacking often fails of success in damp falls. I assert, that we positively cannot afford to husk and grind corn for stock at a profit in these times of low prices for products and high prices for hired help. We must feed our corn to cattle unhusked and unground, letting hogs gather up the corn the cattle fail to grind. It will be seen that the kind of silo I propose is simply a room for storing, in a very compact form, fodder corn or field shock corn which all farmers now raise, but which they cure and handle in various ways, usually at greater expense than in the silo. If it is objected that shock corn will be too dry in the silo, I will say, not at all; when at best it will be about half water or thereabouts. Let any one cut up a lot of corn fodder and pile it on the barn floor, covering it up with blankets, and it will soon appear to get quite moist and begin to heat. The water from the stalks is disseminated through the mass and the whole appears moist in consequence.

By passing the shock corn directly through the cutter all can be put into the silo cheaper, and in less time than it can be husked, and there is no expense for cribbing or grinding the corn. When winter comes, instead of chopping around the frozen shocks and pulling them out of the snow, one has only to draw a load of nice, bright ensilage from the pit to the feeding stable without any loss in any way.

What farmer cannot see the reasonableness of this system of storing shock corn, and that it is the most economical that has yet been devised? We have done away with hauling in all the tons of water that are in fresh fodder, and at the same time have saved all the food in stalks and corn, and at a cost no greater at most than that of simply husking. We already build barns to store hay in, because in the end stacking is a wasteful process. In the near future we will build silos to save our corn crop, because the waste of having the shocks in the field, or of stacking is too great to be borne when the silo can so conveniently take the place of these processes.—*Farmers' Review.*

A VISIT TO KEW GARDENS.

NO. II.

At the entrance to the orchid house for species from hot climates was conspicuously placed a splendid plant of *Dendrobium alboluteum* from India, with four long spikes of rich yellow flowers, each spike composed of from 50 to 60 individual flowers; it was truly a splendid plant. Many well flowered plants of *Dendrobium nobile* from Assam, helped to augment the fine display in this house, whilst in the cooler house, a number of plants growing on blocks suspended from the roof, added not only beauty to the general group but exquisite and powerful scent besides. These consisted of plants of an orchid from South America *Cattleya citrina* bearing golden yellow flowers of large size sing'y on a stem scenting the whole house, numerous plants and varieties of *Odontoglossum alexandræ,* also from South America were also in full flower in this house adding greatly to the show, with their splendid spikes of delicate white pink and creamy flowers and which are such great favourities in the making up of choice and expensive bouquets. *Cypripediums,* or our lady's slipper in numerous and curious species were also in bloom; many of these plants are natives of India and are very curious and interesting. One species *C caudatum,* a species from Panama being amongst the most curious of orchids, the long tail-like petals are the most extraordinary part of the plant often reaching when fully developed to the length of *thirty inches, giving* the plant a most wonderful appearance. Many other species were also in bloom but too numerous to mention. These plants are becoming more and more popular every day in England, and as many species come from cool climates and in large quantities, orchid growing is getting to be quite common even amongst people with limited means, as plants can frequently be picked up at sales at a remarkably cheap rate, and with regard to orchids from temperate or cool climates there is as little trouble required for their proper cultivation as there is for an ordinary geranium or fuchsia, so that the cultivation of this truly aristocratic tribe of plants is likely, ere long, to be developed to a yet greater extent in England. Firms exist in London and its suburbs that employ a regular army of collectors all over the world, whose duty it is to rob the jungles of their natural treasures, establish them in glass cases, or pack them in dry moss, and transmit them to England for the decoration of the glass-houses and drawing rooms of the wealthy. The climate of Ooty, and other parts of the hills would admirably suit such kinds as *Odontoglossoms, Oncidiums,* and many others from temperate regions; and others from hotter parts could be grown and flowered with success under the shelter of glass structures, I imagine, with only a tithe of the trouble required for the cultivation of such plants in England. There are many grand species to be found in the Wynaad and other districts surrounding the Neilgherries, such as *Succolabium guttatum, Dendrobium album,* and others which could be collected with but little trouble and would amply repay any time spent on their cultivation. The two abovenamed kinds could be transported with the branches of the trees they are found clinging to, thus obviating the ill effects produced by detachment from the trees, and re-established on blocks of wood or baskets afterwards.

The palm house at Kew on the day of my visit was patronised as usual by crowds of admiring visitors, and certainly the bringing together of such a vast collection of palms, cyclads, tree ferns and other splendid tropical plants from all parts of the world has produced a wonder exciting spectacle, and one not easily effaced from the memory. The Indian palms, and no doubt those from other countries also—look every bit as healthy and as much at home as in their native clime, and the house is so splendidly arranged and furnished and kept in such beautiful condition withal, that a visit to it is a treat of no mean order. I saw the two tall coffee trees near one of the entrances to the building as usual, in excellent health and carrying some withered " cherries," and many clusters of recently withered flowers. The leaves and general appearance of the plants differed very little from those to be seen on the Neilgherries or in the Wynaad, setting the mind to work in wondering if coffee cultivation in England under glass would be likely to " pay."

Although the arrangement of the plants in the palm house, the general appearance of the building, and the splendid growth and health of the various orders of plants left little to be de sired, such can hardly be said of the collection of plants representing the flora of Australia, New Zealand and Tasmania. But the fault does not lie with the officials of Kew, but rather with the nature of the English climate and the almost insuperable difficulty of growing so many specimens of plants and trees, many of which grow to an immense size, in pots, with any hope of maintaining or developing their true character. Take the *Eucalyptus* family for instance, true we have the various species represented, but few are in true character, and give but a very faint idea of what the trees are in their native country. It is quite different with most of the palms and other plants to be found in the palm house; these thrive and grow to their full natural size in comparatively confined and cramped root spaces; but to exhibit the family of *Eucalyptus* in anything approaching their natural conditions would, of course, be a hopeless task in England, and while looking over the collection at Kew I could not help thinking how differently examples of nearly all the Australian flora could be grown and exhibited at Ootacamund, and what a splendid botanical garden could be established and upheld at a comparatively small cost in such a climate. Thousands of plants from such countries as China, Japan, Australia, New Zealand, &c., which in England require the protection of glass, could be brought to their fullest development in such a climate as Ooty, without any such protection, and thousands of others from warmer climes could be equally well grown with simply glass protection without the addition of fire heat which is such a heavy item of expenditure in England.

Kew gardens are not open to the public till twelve noon on week days, and 1 o'clock on Sundays: and no bag or parcel of any kind is allowed to be taken beyond the lodge gates, so that there is not the slightest chance of any one desirous of taking an early summer morning walk in the extensive grounds, or enjoying anything resembling a pic-nic, having his or her wishes gratified. These restrictions, to my mind, are very absurd. I would not of course, have cricket nor such like games played on the velvety lawns of Kew gardens, but as matters stand now visitors are allowed to walk on these lawns and to rest under the grateful shade of the many wide spreading trees to be found all over the grounds, and what harm could possibly result from the public, if they chose partaking of tiffin while so resting, it is difficult to conceive; true there might be a few bare bones and pieces of paper left behind, at first, but this difficulty might be overcome by adopting certain rules and rigidly enforcing them, and the comfort and pleasure to the tens of thousands of people who annually visit the grounds would be very greatly enhanced by some such concession. As matters stand now, no one can have any refreshment within the grounds, save and except what he can smuggle it in his pockets, and it is quite impossible for anyone to inspect the gardens to any purpose under a good many hours, so that the rules of the garden as they at present stand are undoubtedly productive of much discomfort to the public. Another rule is that no one shall enter the gardens unless "decently dressed." I wonder who are our judges in such matters, and on what grounds their decisions are based? Dear old Ooty, "with all thy faults I love thee still"! Well do I remember thy charming gardens free to every one, from earliest dawn till dark night; where one could enter either in the garb of a West-End exquisite, or dressed in *shikaree* garb of rubicund jail cloth, and battered helmet or mushroom hat and be welcome all the same, and where no fault was found if a following of coolies accompained his steps to thy pic-nic ground on the hillside laden with heavy baskets of various requisites for the inner man. But in Rome, I suppose, we must do as Rome does, and put up with these discomforts at Kew, of carefully dressing before entering the gates and refraining from bringing with us anything in the shape of refreshments till such as an agitator or two, with equal ability time and energy, to Messrs. Parnel and Co, bring about the repeal of these rule in the House of Commons.

The institution was started in the first place and subsequently maintained by large Government grants, mainly for the purpose as I imagine of instructing the public, and that being so every inducement should be held out for the largest number of people visiting and inspecting the gardens, instead of such rigid restrictions as at present obtain. Visitors from a distance anxious to make the most of their time cannot be expected to leave the gardens in the midst of their ramble, and just perhaps when their interest in all they see is becoming greater and greater, for the sake of adjourning to a refreshment house for a dinner or a much-needed cup of tea Kew gardens are of great extent, and it takes a long time to see everything, so that it is absolutely necessary that these restrictions should be reversed if anything like a comfortable holiday is to be spent there. The Londoners, too, who do so much to make up the annual total of visitors, feel the effect of these rules perhaps more than anybody else, for a Londoner bent on holiday making is nothing without his tiffin basket, and one effect of these rules is undoubted to keep away many thousands that would be otherwise glad to spend a day at Kew gardens, occasionally very greatly their benefit.

Kew is doubtless a glorious place, a garden of beauty and wonders, but many months in the year one can only find enjoyme under the shelter of the glass roofs owing to this fickle climate ours. Imagination can picture what kind of garden could brought into existence in a climate like Ootacamund if equal courgement and support were accorded it as at Kew.

India with all its wealth and great advantages can boast of no thing like Kew, her so-called Botanical Gardens are many of them unworthy of the name, and of a great and mighty—empire. Let us hope that the Madras Presidency will soon take the initiative in striving to transform by every means in its power, the Government Botanical Gardens at Ooty, from their present embryo state to a condition worthy of their name and the magnificent district in which they are situated.—HORTUS, *in the Nilgiri Express*.

FLOWER GARDENING.

In describing in my recent papers on Kew Gardens the appearance of the early spring flowers and especially a patch of polyanthus and primulas on the grass, near the Cumberland Gate entrace, I did not know at the time that this portion of the grounds was especially set apart for the illustration of a natural style of gardening; it is called the "wild garden," and commands a prominent position in the form of a large mound to the South of the rockery, and devided from it by the main walk from the Cumberland Gate, it borders No. 1 Museum, the pond near the Palm House, the walk from the latter house to the T range flanking the west side of it.

The cultivation of a natural style of gardening as opposed to the present popular system of massing, ribboning, and carpet-bedding, would appear to be making considerable progress in England, and doubtless has received great encouragement from the efforts made at Kew, within the last few years in this branch of gardening, and we would seem to be slowly returning to the old state of things, before the adoption of the present almost universal style of glaring flower gardening, and from that perhaps may spring up a style of natural gardening, more pleasing and beautiful and more permanent than any style yet adopted in England.

There is no doubt something very grand in the first sight of the London Parks in the month of August, when the flowers are in the height of their beauty, but I venture to think, that with most people, the pleasure is decreased by each succeeding visit instead of being heightened as is almost invariably the case, by each succeeding walk in Nature's flower garden in the country; or when gardens are visited wherein the natural style is principally aimed at. I do not envy, for instance, the feelings of the man who failed to extract deeper and deeper pleasure from every returning, visit to that charming group of polyanthus on the green at Kew, although I can quite understand the cloying effect on the minds of most men produced by frequent visits to the stiff and formal, the passing rich displays of our modern English flower gardens, and the sooner the style is abandoned the better it will be, I think, for the interests of the true art of gardening which after all would seem to be a careful and close study and imitating of Nature. The bedding or massing style, if admissable at all must only be under peculiar circumstances and in certain situations, and then only adopted with the strictest regard to the proper blending and fusion of colours, which if understood by the gardeners of to day is seldom practised by them. I would not be understood to condemn the massing style of flower gardening, for after all this is only style filched from the book of Nature; but in Nature, the colours are so arranged as never to offend the eye or pall on the mind. In this art of blending colours and in the production of a setting to his massing of plants and flowers, the modern flower gardener I think, acts wisely in calling to his aid the artist who is versed in such matters, to whom the colours of the various flowers to be employed might be submitted, and by whom a plan might be executed and submitted with due regard to the harmony of colours. We would then have less of that jumble and glaring contrast which annually offends the eye in all the London parks.

It is the habit of the horticultural papers, in describing the "bedding" in the parks to invariably speak of it in unqualified praise, and with frequent reference to the "scheme" of planting when it is self-evident that no scheme is employed at all, and when in too many cases the most ordinary care is not taken to smooth down or prevent the most violent contrasts of coulouring. To my eye last season there were only four beds in the Finsbury park; which is one of the smallest but best kept of any——which were planted with a view to the pleasing blending of colours. The plants used were *verbena venusta*, which by the way used to grow very abundantly in the Ooty gardens——and *Cineraria maritima*, the pale purple flowers of the first, and the soft white foliage of the other producing a most charming effect. Then the plan of raising the beds far above the level of the grass which is adopted all over London, is objectionable in many ways, the soil becomes drier much sooner and they look stiff and have a stamped out appearance as if formed in the same manner as pats of butter. Frequently the sides of these beds all round are formed of clay and a foot high and stuck full of *Echeveria glauca*, whose flowers are carefully removed as they appear throughout the season. They are very beautiful and if allowed to remain are the only things that would relieve the extreme stiffness and painful trimness of the whole bed.

In advocating a natural style of flower gardening I do not mean of course, that only wild or indigenous plants should be used, but that all our present bedding plants, many of which are unquestionably of great beauty, might be used as now, but in different ways. Let us do away with this glare and stiffness for something more graceful and natural, this clipping and shaving foliage to imitate carpets as if carpets were the model of beauty the world and were ever seen in nature. If a plant is stiff and nal in its natural form, compensation is mostly found in the the gracefulness of its flowers, and to remove these is simply a insult to nature which in cases like these cannot be assisted art. It would perhaps be will if Kew were to continue and plement its endeavours to bring about much needed age in the art of flower gardening; but the nature of the grounds siderably against experiments on a large scale nearly whole of the garden being as flat as a paddy field. objection does not hold good however with regard to your at Ootacamund. They present conditions for carring out natural style rarely to be found in England. I have frequently it what splendid results would follow the laying out of large

grounds like Bishopsdown and other noble properties at Ootacamund, on a strictly natural style, where indigenous and foreign plants could be brought together in infinite variety and grown with less expenditure of trouble and money than in any climate in the world.

I forgot to mention a plant I saw in flower at Kew and which is much grown in conservatories in England and one, if not already on the Hills, I would advise lovers of flowers to procure at once. I mean *Deplacus glutinosus* it produces very beautiful mimulus-shaped flowers of a soft buff colour and is best grown in a pot, at least in England, but might grow into the dimensions of a shrub at Ootacamund and elsewhere on the Neilgherries. It is a good room plant, and if you put it in an ordinary dark room there is nothing very particular about it, but if put in a room facing the south with the blinds drawn, the gleams of subdued light through them act upon the buff coloured flowers, giving them a soft sweet effect not easily described. Those who wish to enjoy its full beauty must view it from some little distance and take care that the plant is placed in front of the window where the action of the light upon the flowers will be as stated.

A recent sale of Orchids at Downside Leatherhed belonging to Mr. W. Lee, has attracted a very great deal of attention from the extraordinary high prices obtained for some of the specimens, one plant having fetched the sum of £325 10, the highest sum ever paid for one orchid. The total sum realized in the two days' sale was nearly £6,000, and this was only for duplicate plants in Mr. Lee's collection, and to make more room for those that remain. The plant above alluded to is called Cypripedium Stonei platytænium, a native of Borneo, and was bought by Baron Schröder after a spirited competition, for the abovenamed sum. Single plants of other sorts brought £105, £94 10, £157-10 £180, £162 15 and so on; so that the wealth of England, as represented by its plants of Orchids collected from all parts of the world, must amount to a very respectable sum, as very many of the collections to be found in our large nurseries, and in the pos session of private gentlemen, are both valuable and extensive. Amongst the plants sold was one of Sococolabium Heathi, an East Indian Orchid which fetched £ 157-10. This is said to be the only plant of the kind ever found, though the forest where it was discovered has been carefully searched.

A very beautiful primula was exhibited by a nurseryman, at a recent show held in London by the Royal Botanic Society, it is called Primula obtusifolia Gammieana. It was found in Sikkim, at an elevation of 15,000 feet in a sunny position. It is a very beautiful variety with deep purplish crimson flowers and might grow well in your climate. The primula family is so pretty and interesting, that I cannot forbear giving the names of one or two more as likely to suit the climate of the Hills. Primula Capitata, belonging to the denticulata section, deep crimson purple, bright yellow eye, stems 6 to 9 inches, like shady position and plenty of moisture, from the Himalayas. Primula Carhmeriana, same type as last, one of the most beautiful of the group, Himalaya. P. pulcherrima, denticulata type, stems 15 inches deep, lavender purple, clear yellow eye. Primula longiflora, beatiful species, farinosa type, bright rosy—purple long tubes fine, aroma of musk.

With regard to the primula lately exhibited from Sikkim the species is said to be exceedingly variable, several forms having been already described, which indicates the probability of its being useful for crossing with other primulas. Some specesare exceedingly conservative in this respect Brimula Japanica for instance When this plant was first introduced. It was thought that it might give rise to a distinct type of garden forms or hybrids, but in this respect it has not realised the exepcotations formed concerning it.

Several grand exhibitions of Auriculas have lately been held, which are of course a very near relation of the primula. Many of the kinds shown were beautiful beyond description I do not think it possible to describe the colours of some of the flowers, they are so varied and curious. but these sorts are of no use for out of door decoration. they all require the protection of glass to bring out and maintain, their beauties. Some time ago at an exhibition at Regents park primlaes were shown in a very charming manner. A beautiful back was formed in the corridor the plants being set in mass informally as dells or mounds not in parallel rows as most exhibitors seem to consider the correct mode. The variety of colour was simply wonderful varying from pure white to the deepest crimson and purple.

To finish my remarks on these universal favourites, *viz.*, Primulas and Orchids, an incident happened in the House of Commons on the evening of the 17th instant, when the irrepressible Tim Healy gave to the Government and Liberal Unionist portion of the house the name of the "Primrose Orchid Party." This phrase will in all likelihood stick to them, and I think Tim is to be congratulated upon inventing so happy a phrase for that section of the House, the first-named flower representing as it does modesty as well as many other graces, and the litater al the above with the addition of aristocratic dignity!—It Hetus, in *Nilghiri Express*

FOODS SUITABLE FOR DYSPEPTICS.

"As certain men cannot do certain kinds of work, and as the system at times is incapacitated for work which at other times is easily performed, so it is with the human stomach. This organ should never be given more work than it can readily accomplish. As soon as a person becomes aware by subjective symptoms that he has a stomach, his digestion is not right. Over-feed or tax a weak stomach, and you will as surely weaken the man. If the digestion is imperfectly performed, the products of such digestion will necessarily be imperfect, and to feed a man's system with imperfect digestive products is to maintain a species of chronic poisoning. There are more people who suffer from the poisonous products of their own system than is generally supposed.

The food of man is, after all, ephemeral stuff which will often putrity in a few hours. Fish is an example of this, and nothing in the line of food is worse than tainted fish. The minute it bigins to change it froms a poison, which operates on the human system with great power. The same is the case with eggs. In these last articles of diet we have however all that Nature has provided for the sustenance of life, for a period, and they are most valuable if beaten up, and not hard boiled; but let the eggs be turning ever so little and they may prostrate the one who eats them like deadly poison.

"Here is a very strange and curious fact. If the products of albumenous digestion could pass directly from the stomach and intestine into the system, they would poison the individual at once. The provision is, however, that as the meat gluten, casein, &c., are digested, they pass next through the liver, which acts as a regulator, or dam, preventing the too rapid onflow into the system.

Similarly it is known that in snake-bite, if the poison is not all precipitated into the circulation at once, the result may not be surely fatal. Thus the good effects of bandages round the limb, one above and one below the bite.

After a full, hearty meal there will sometimes be felt, in health, a feeling of prostration; the legs seem weak and the body heavy; this is all due to a rapid pouring of digestive products into the system.

The dangers to the dyspeptic appear to be two-fold; improper food constituting one source, and perverted digestive action the other.

Let us suppose an aggravated case of simple dyspepsia. There are pain, distress, flatulence, eructations, bad taste in the mouth in the morning, mental apathy, and an indescribable sense of langour; sometimes the bowels are constipated, at others there is diarrhœa. There is occasionally vomiting—perhaps the vomiting is tolerably constant. The kidneys do not work well, and the urine is dark and heavy, and again very light; sometimes it is profuse, and some times scanty. The face bears the worried irritable and anxious look of the man with his stomach 'all out of order.'

the two prime foods to begin with in a case like this are milk and eggs. Let those who think these poison to them reflect for a moment. The reason cow's milk does not agree with man is because he does not ruminate. The cow's milk forms a heavy curd which the calf breaks down in rumination. It was never possible for any stomach to *entirely* digest cow's milk. Milk for the dyspeptic should always be peptonised, when it will no longer curdle, but flake like the milk of all the non-cud-chewers. (To peptonise milk, simply add to each pint one Peptonising Powper.) Now, as to eggs. Few things are more digestible than the white of an egg "well beaten," and moreover it is very highly nutritious. It is a great mistake to suppose that all the nutriment of an egg is in the yolk. An egg may be beaten up in different mien, and its taste and nutritive value further augmented by adding a good extract of malt. Kepler's is delicious and in every way a superb malt. Sometimes a bit of dried salt cod fish will agree well, especially after gastritis. A very thin slice of dried beef many a time gives satisfaction, and is relished, but must be well chewed. While coffee is not to be commended; a sip of black coffee without much sugar and cream has been known to work like a charm. 12 hours after the dyspeptic has to take opium to ease his pain. Some of the baby foods of the market are excellent for dyspeptics, though, in some respects, they do not equal a good malt extract, and are unnatural and unfit for infant-feeding. The bread eaten should be stale, and it is an excellent plan to soak it in water for a little, pour off the water, and eat the breadin peptonized milk; by this process all acid is removed from the bread If solid meats can be taken they should be such as were indicated in number One. If the meat cannot be taken solid it should be pre-digested. Bad meats must be scrupulously guarded against. —*Family Doctor*

The Berlin *Deutsche Zuckerindustrie* announces that Denmark has entered the lists of nations competing to supply the United Kingdom with sugar at less than cost price. The Parliament and the King have sanctioned an export bounty of ¾ ore per pound, equal to about 10*d.* per 100 pounds. This measure, which especially favours the runnings, is greeted by the Danish sugar industry as the "beginning" of a system of State support. By a decree which has received the sanction of the President of the French Republic, the import of all foreign sugars into Martinique, Mayotte, and Nossi Be is absolutely prohibited. The object of this is doubtless to prevent the re-export of foreign sugars from these Islands as French Colonial Sugars, when they would be entitled to a rebate of a proportion of the duty equal to the bounty enjoyed by the

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Health, Crop and Weather Report.

[FOR THE WEEK ENDING 30TH JUNE 1887.]

Madras.—General prospects good.

Bombay.—Rain throughout the Presidency, except the Upper Sind districts; more still wanted in parts of the Deccan, Bijapore, and Panch Mahals. Sowing operations progressing in parts of several districts. In Sind great anxiety felt for *kharif* cultivation, owing to the inundation of the Indus being much below average Fever in parts of six, small-pox in parts of four, and cholera and cattle-disease in parts of ten districts.

Bengal.—General rain fell at the beginning of the week; from the 24th to 27th there was a break in the rains, except in the northern and eastern districts. The monsoon winds are now again strengthening, and more rain is expected. Early rice, Jute, and Indigo promise well; but in Rajshaye and Bhagulpore divisions some damage is reported from excessive rain. *Aman* and *bhadoi* are being sown, and in places transplanting of *aman* seedlings has begun. Cholera is diminishing in the Patna division, and elsewhere general health is good.

N.-W. P. and Oudh.—Rain has fallen in nearly every reporting district, but more is wanted for *kharif* sowings. Cane and indigo crops are in good condition. Cotton sowings commenced Supplies ample, but prices are still rising. Cholera continues to be reported, and is increasing in some places.

Punjab.—Rain has fallen in all districts, except Jullundur, Lahore, and Peshawar. It is wanted in Hissar, Delhi, Umballa, Lahore, Rawalpindi, and Peshawar. Health good, except in Peshawar, where it is fair. Prices are stationary in Hissar, Jullundur, Amritsar, and Multan; almost stationary in Delhi, Lahore, Dera Ismail Khan, and Peshawar; rising in Umballa, Ferozepore, Sialkot, and Rawalpindi; and falling in Shahpore. *Rabi* harvesting completed in Sialkot. *Kharif* ploughings in progress in Jullundur, and commenced in Sialkot. Sowings commenced in Rawalpindi, and in progress in Peshawar. In Multan, Shahpore, and Dera Ismail Khan prospects have improved. Crops good in Amritsar. Fodder is scarce in Shahpore.

Central Provinces.—Good rain has fallen in most districts, and sowings are progressing favourably. Fever and cholera prevail in places. Prices show an upward tendency in a few districts.

Burmah.—A few cases of cholera and slight cattle-disease in Lower Burma. Ploughing and sowing going on. Reports received from three Upper Burma districts. Health generally good, and prospects satisfactory.

Assam.—Weather rainy. Reaping of *ahu* crop in low land and ploughing of land for *sali* in progress. Some damage done to crops on lowlands by heavy rains, otherwise state and prospects of the crops good. Cultivation of *sali* and reaping of *dumai* and *mu*..*t* crops in progress. Prospects of tea good. Public health fair. Prices steady.

Mysore and Coorg.—Rainfall good in Shimoga and Kadur districts; and slight in other parts. Standing crops in good condition. Prospects of season fair. More rain needed in parts of Bangalore and Tumkur districts and in Pagoda taluk of the latter district. Wet crops are reported to be suffering from deficient moisture. [illegible] health generally good. Small-pox in Tumkur and cattle-disease in Bangalore continue. Prices slightly fallen in [illegible]san district, [illegible]isen in other parts.

Berar and Hyderabad.—Weather cloudy with heavy showe[rs] at intervals. Ploughing and sowing in progress. Cholera, small-pox, and fever prevail in parts. Cattle-disease disappearing. Pri[ces] steady.

Central India States.—Rain has fallen generally; but want[ed] urgently in some places. Prospects of crops favourable. Chole[ra] continues in various parts. Prices steady.

Rajputana.—Weather seasonable. Rain has been pretty general although tanks and wells continue low. *Kharif* operations in progress; the crop sown in some places. Cholera, small-pox and fever prevalent in parts, otherwise public health fair. Prices fluctuating.

Nepal.—Weather seasonable. Transplanting of rice in full operation.

Editorial Notes.

WE have received a most interesting report on the forest administration of the Jeypore State, Rajpootana, for the year ending December 31st, 1886. We simply acknowledge receipt of the report here, as owing to pressure on our space, we are unable to review it at length this week. We hope to do so in our next issue.

IF we are to believe a contemporary, a very important use has been discovered for the *Erythroxylon Coca*. It is nothing less than as a remedy for cholera. It appears that cholera of a very bad type broke out in Buenos Ayres, and the chewing of the leaves of the Coca is said to have cured many cases. The truth of this statement is worthy of investigation.

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THE average price of wheat in the United Kingdom during 1886 was 31 shillings per quarter. The lowest price was 29 shillings during the first week of March; it fluctuated between 30 and 33 shillings from April to October, after which the price rose steadily, until it reached 35 shillings in December, at which figure it stood for the week ending 1st January 1887.

WE note that part I of Dr. George King's monograph on the species of *Ficus* of the Indo-Malayan and Chinese countries has recently been issued. It deals with *Palæomorpha* and *Urostigma*. Fig trees form such a prominent feature in tropical vegetation generally, that we have no doubt this work will prove useful to botanists. This part is illustrated with nearly one hundred plates.

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A LOCAL contemporary gravely makes the following announcement:—"Coca leaves (*Erythroxylon Coca*) are becoming a recognized article of export from Peru, a demand having sprung up for the manufacture of *cocaine*, now so much used in surgical operations for killing pain. The quantity exported from Mollindo during last year, amounted to 705 quintals, and was valued at 17,625 dollars." It is some years now since such a 'demand sprung up.' The price of cocaine lately has fallen considerably, owing to the extensive stock of leaves in the hands of British importers.

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IN support of our argument last week, that the pressure of population on the land in this country was anything but severe, we quote the following figures from the recent agricultural statistics prepared by the Revenue and Agricultural Department of India:—The total area of India has been determined as 1,382,624 square miles, and the population as 253,891,821. Although immense tracts of country are annually cultivated, according to the most recent survey 10,000,000 acres of land suitable for cultivation have not as yet been ploughed, while 120,000,000 acres are returned as waste lands.

A CONSTANTINOPLE paper notes that a full cargo of Indian rice, namely 10,775 bags was imported direct during May from Rangoon by an Armenian firm. This is stated to be the first time that Indian rice has gone direct from this country to Constantinople, having hitherto been carried there by way of England. It is added that the quantity imported at one time has hitherto never exceeded 3,000 bags. The Indian rice trade, both with Turkey and other countries would, there can be no question, rapidly increase, but for the heavy weight with which it is handicapped in the form of the export duty. That impost, as all evidence shows, is giving an advantage to the foreign competitors that threatens ere long to crush the Indian industry.

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THE latest reports from the indigo districts in Bengal show that heavy rain has fallen generally, but no serious damage is said to have been done to the plant. Manufacture has not as yet commenced to any great extent, and the produce is said to be but middling. In Behar rain had fallen over nearly the whole of the district, being very heavy in North Tirhoot and Champaran, but up to the present no damage has been reported. *Mahai* has now become general, and from the few returns received, the produce is said to be fair. Slight rain has fallen in some districts in the North-West Provinces, but more is still much wanted, and prospects continue rather uncertain.

THE statistics regarding the world's production of coffee, as furnished by Sir Augustus Adderly, bring to light the fact that out of a total estimated quantity of from 6 to 650,000 tons, Brazil alone yields more than half, while Java produces from 60 to 90,000 tons. British-grown coffee only amounts to about 35,000 tons, of which India contributes about 18,000, Ceylon 12,000, and Jamaica 5,000 tons. It is, however, satisfactory to learn that, although the quantity produced by India and the Colonies is comparatively small, this deficiency is made up by quality, for Sir A. Adderley says :—" Nowhere is finer coffee grown than in India and Jamaica, and its value, as well as that of Ceylon, is firmly established above that of all other kinds, even of Mocha, which at one time stood above all others."

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THE Rangoon correspondent of a contemporary writes as follows, regarding the attempts of the local Government to introduce improved agricultural implements amongst the Burmese, which he says have only partly met with success :—" Six Watts' ploughs were tried by the cultivators, five harrows devised by Mr. Cabanis were lent as models, and five more were made and used by the cultivators. Two horse-power threshing machines were imported from America, and a new mill for pressing sugarcane. The Burmese are now only becoming masters of the implements, and although they experience and see the superiority of modern appliances, the cost is too great, being the great drawback for general use. The sugarcane pressing mill was supplied by Messrs. Thomson and Mylne at a cost of Rs. 510, but that firm is now engaged in constructing similar mills at a cheaper rate."

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THE same correspondent says :—" An experiment was made at considerable expense by Goverment with trawling gear at the Krishna shoal to try deep-sea fishing, and two Europeans, who were practically acquainted with the industry and working of the gear at home, were sent out in company with expert Burman fishers to conduct the undertaking. After a fair trial the experiment was found to be unprofitable and accordingly stopped. The attempt to introduce improved appliances amongst Burman fishermen was also a failure."

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A BELGIAN scientist, we are told, has been at the pains of calculating that the weather on our globe repeats itself in cycles of sixty-two years. He shows that the barometric and thermometric readings in London for 1885, 1886 and 1887 are practically the same as those for 1823, 1824, and 1825, and he asks men with more means than he possesses to continue the comparison through the complete cycle of sixty-two years. Then he argues that " if we can refer to a year which had practically the same weather as that which we are experiencing this year, it is of the greatest importance that the astronomical authorities of each country should utilize that knowledge to the advantage of the commercial and agricultural industries of the community generally." He also proposes to show, by an examination of the moon's phases at an interval of sixty-two years, that not only has the moon an influence on the weather, but that the moon is the cause of the weather.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 30th June, 1887 :—Good rain has fallen generally throughout the country during the week under report. The falls were lightest in the North-Western Provinces and Oudh and the Punjab. *Kharif* sowings are progressing favourably in Bombay, Berar, and the Central Provinces. In Sind great anxiety is reported to be felt for *kharif* cultivation, owing to the inundation of the Indus being much below average. In the North-Western Provinces and Oudh and the Punjab, more rain is wanted for the *kharif* ploughings. Agricultural prospects continue satisfactory in Madras, Mysore and Coorg. In Bengal the early rice promises well, and the *amun* rice is being transplanted. One variety of the rice crop is also being transplanted in Assam, and the reaping of three other varieties still continues. In Burmah sowings have begun, and in Bombay they are progressing. Except in Rajshahye and Bhagulpore, indigo is doing well in Bengal, and the crop is in good condition in the North-Western Provinces and Oudh. Cotton sowings have commenced in the North-Western Provinces and Oudh. Tea promises well in Assam. Cholera is increasing in the North-Western Provinces and Oudh, and in three districts of the Bombay Presidency the mortality from the disease is still high. Elsewhere the public health is generally satisfactory. Prices are rising in the North-Western Provinces and Oudh, and in four districts of the Punjab, and show an upward tendency in a few districts of the Central Provinces. Elsewhere they are on the whole steady.

THE *Pioneer*, in calling attention to a letter recently written by the author of the article on "Wheat Production in the *Quarterly Review*, (noticed by us a short time back) in amplification of his argument as to the influence of low exchange on India's export trade, says :—" Mr. O'Conor, in his Note appended to last year's report on Indian trade, had contended that low exchange cannot have the effect of stimulating exports, ' because the prices of almost all Indian produce in European markets have fallen in greater ratio than the rate of exchange.' Whereupon the *Quarterly* reviewer says, it is strange that Mr. O'Conor cannot see that it is only by the help afforded by the low rate of exchange that exporters have been able to keep on exporting at all. There seems to be some misunderstanding here. All that Mr. O'Conor's words need be taken to mean is, that a wheat exporter would, other conditions being constant, get exactly the same number of rupees for a quarter of wheat whether the exchange were high or low, because as you lower the exchange you lower equally and coincidently the gold prices of produce. Exchange then gives the exporter no advantage, so far as prices are concerned ; it leaves him in this respect precisely where he was. That low exchange may lead to an increase in the bulk of a particular export trade from a silver-using country, is another matter. Such a trade does not feel the lowering of gold prices, which takes place simultaneously with the fall in exchange, and which is felt by exporters or growers of the same produce in a gold-using country ; but it is not the less inaccurate to parallel this by the effect of a Government bounty, for such a bounty increases the actual price paid to the exporter."

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THE Excise report of the North-western Provinces and Oudh has one remarkable feature about it. After reviewing ... measures adopted to restrict the consumption of liquor ... poorer classes of the people, Sir Alfred Lyall says.— ... Eastern countries these classes are large consumers ... coffee, and it may be conjectured that had these pro- ... , or long cultivated in the Indian pen- ... by this time have assumed as important a ... in the domestic economy of Indian households as they

occupy in China, Thibet, or Turkistan. It is upon these considerations that the North-Western Provinces Government have endeavoured to promote, by special measure, both the sale of dry tea in small packets, in the larger towns and cities of the North-Western Provinces and Oudh, and the establishment of tea-shops on the model of European coffee-houses. Some of the larger municipalities have interested themselves in the experiment, and the Deparment of Agriculture and Commerce was utilised to procure good tea at wholesale rates for the retail vendors. Sir Alfred Lyall observes with much interest the recent formation of an Association in Calcutta, which proposes to take the question up seriously and systematically in Bengal and in Upper India, and he is prepared to co-operate heartily with it should the Association see its way to extend operations to any districts in these Provinces. The subject at first sight seems remote from the administration of Indian excise; but the experience of European countries has shown that it has in reality an essential connection with it."

This is the first instance of the kind we know ot, where an administration has laid itself out to counteract the evils of drunkenness by promoting and encouraging the consumption of tea. We have already stated the causes which, in our opinion, have prevented the people of India becoming a nation of tea drinkers; but a change has come over the spirits of the Indian tea-dealers, which cannot fail to have very wide-reaching effects. We heartily wish Sir Alfred Lyall success in his endeavours to promote a liking for tea among the people under his care, and hope that other administrations will not be slow to follow in his footsteps.

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A Ceylon correspondent tells us that the Forest Department in that colony is about to be reorganised, and for this purpose an Indian officer is to be procured for a term of five years on a salary of Rs. 1,000 per mensem and allowances [illegible] this period it is expected that a young officer, [illegible] England, Germany and France, will be sent out as head. "Hitherto the systematic conservation of our forests has never been attempted, and although we have a forester for each province, still they were appointed [illegible] had their training for such a post I fear, in most cases was *nil*, the sole qualification being that they had a claim on the colony and had failed to be efficient in previous appointments held by them. Mr. Vincent was over here some short time ago, and if his recommendations are carried out, there is work for a very large department. The provisions of Mr. Vincent's report, if carried out, would land every second villager or rural inhabitant of Ceylon in gaol, and the reserves in the Kelani Valley between Adam's Peak and Ambagamuwa ranges on the one side, and Dolosbagie on the other contain many a block highly coveted by the tea-planter, more especially of it was blocked for sale and withdrawn on Mr. Vincent's report. This license and liberty on the one hand, and want of organisation on the other, will now draw down upon Government many a growl, and the expense will naturally be brought forward as an argument against adoption."

The recent report submitted by Colonel Conway-Gordon, the administration of Indian Railways brings to light the fact, that the serious falling off in the wheat export trade of the Punjab during the past year was due to high prices and comparative scarcity of grain. But that what the Punjab and the port of Karachi lost, was more than made up by the increased traffic [illegible] the lines serving Calcutta and Bombay. The following figures show the quantities carried by the important exporting railways during the past three years:—

Railways.		1884. Tons.	1885. Tons	1886. Tons.
Great Indian Peninsula	...	400 881	457,842	[illegible]53,36[illegible]
B. B. and Central India	...	59,69[illegible]	178,231	[illegible]46 2[illegible]
East Indian ...	...	186,043	369,000	[illegible]15,2[illegible]
S. P. & Delhi ...	N.W. ...	249,519	[illegible]55,391	
Punjab Northern ...	N.W.	79,812	[illegible],664	249,[illegible]20
Indus Valley ...	N.W. ...	203,632	[illegible]35	

For purposes of comparison the quantities [illegible] carried by the Punjab Northern and the Indus Valley, may [illegible] omitted for the years 1884 and 1885. The exports of wheat from the three chief ports have been—

	1884. Tons.	1885. Tons.	1886. Tons.
Bombay	376 834	565,376	623,217
Calcutta	130,004	213,759	338 414
Karachi	193,000	325,981	179,857
Total ...	699,838	1,105,116	1,141,488

The result of this falling off has been a decrease in the net receipts of the North-Western Railway, of 20 lakhs of rupees, as compared with 1885. The Great Indian Peninsula and the Rajpootana-Malwa show very large increases, amounting respectively to upwards of 47 and 10 per cent of the total increased Railway earnings of the year which, according to Colonel Conway-Gordon's report, are over 63 lakhs. The total traffic in grain and seeds in 1886 shows an increase over the preceding year of 82,540 tons, or about 1½ per cent.; the totals for all the Railways being—

In 1885	Tons	5,393,789
„ 1886	„	5,476,329

MANDALAY MANGOES.

I noticed in your last issue (June 25th) an article on mangoes from Mandalay. My name is mentioned as an authority, but in this instance, not having seen the fruit it is impossible to say what it is. I take very little notice of what is told me about the fine flavour of this or that mango. A great deal depends upon where, and under what circumstances, you eat mangoes. I well remember the first I ever ate, and I thought it delicious; it was at a friend's house in Hong-kong. The fruit had been brought from Manilla. I was fresh from board-a-ship and had not tasted fruit for some time, and that was the reason I liked the "tea-and-turpentine," or better, the carrot-tasted mango from Manilla. I made careful notes about this fruit, and was able to compare it with good Indian mangoes. The gentleman writing from Mandalay was perhaps placed under somewhat similar circumstances, for he says: "Nothing is more pleasant after having ridden from daybreak till noon." I quite agree with him, and if he happened at noon to rest under one of our good *beeju* trees, or seedlings, and satisfied himself with a good meal of really nice, sweet, juicy mangoes, it would make, I think, a lasting impression on him, and he would always say they were the best mangoes he had ever eaten. There are also *jungli* mangoes, or really wild fruit, the original species; and jungle mangoes, the deteriorated stock of cultivated fruits, grown from good fruits that have been eaten on the roadside and the seeds thrown away. It is, I should say, the latter the Mandalay gentleman has eaten, for I doubt if he would care to eat more than one of the real jungle mango, at least such as grow at the foot of the Himalayas; and I imagine it is the same species all through Burmah. Burmah being an "old" country, they must have carried on a systematic selection of this fine fruit by accident, the same as has been done in India.

About the so-called best mango—the *Bombay*—or, as it should be called the *Afooz* or *Alphonzo*, as there are so many Bombay mangoes, it is no better than many in Tirhoot and Malda, or Madras. The much vaunted Malda *Fuslee* is really not to compare with some of the other Malda sorts. The real *Bombay*, is not a Bombay mango at all! It came originally from Salem in Madras, and does so still. One of the great secrets about good mangoes is, that they should never be eaten fresh-gathered from the tree. This is the reason the *Bombay Afooz* is so good. It is gathered rather unripe, goes a journey of perhaps a week, and arrives in prime condition, no "string," no rank flavour, but something too delicious to describe in words. If this same mango had been eaten fresh-gathered, probably it would be pronounced inferior.

I will refer to Firminger's description of a fruit called cherimoyer or cherimola (*Anona cherimolia*). One man says that no fruit in the world is like it, being the "masterpiece of nature." Dr. Lindley says: "One English pear or plum is worth all the cherimoyers in Peru." I should be inclined to say the same, in comparing mangoes of India to other mangoes of the world. The Indian mango is the result of cultivation of centuries. Very few people living in India know where the fine mangoes

are, but I can say I have had opportunities of eating and seeing mangoes to which even the much-talked-of Bombay is a little inferior ; even the fine English pear does not beat it in flavour. I hope shortly to give you a list of some really good mangoes from a catalogue of some 500 varieties of this fine fruit.

C. M.

NOTE.—We shall await the list with interest.—ED., *I. A.*

MADRAS AGRICULTURAL DEPARTMENT.

IN matters agricultural, at least, the Southern Presidency displays commendable activity. We have before us the report of the Agricultural Department for the past year, which is a record of unusual interest. There is first the report itself, drawn up by Mr. C. Benson, the Assistant Director; comments thereon by the acting Director, Mr. Grose; a Resolution by the Board of Revenue, and an 'Order' by the Government; the whole forming a bulky volume of 74 pages. It is not possible, therefore, to review exhaustively in an ordinary article the various subjects discussed, and we must therefore content ourselves with noticing only the more important features of the past year's work.

The analysis of districts, with reference to security from famine, is a subject of more than ordinary interest, but it is a matter for regret that for various reasons it has been found impossible to proceed with the work. The scope of the original scheme for this purpose has been considerably enlarged, and owing to the difficulty of at once appointing district agricultural inspectors to work under the orders of the Assistant Director, (there being no provision in the Budget for this expenditure) the work did not progress as it might have under other circumstances. In this connection Mr. Benson says :—

"My preliminary inquiries have taught me much. They have shown me that our agricultural statistics are in many respects utterly misleading : there is practically no check on the correctness of the entries made by the village *curnams*, and compilation is done in a very loose manner." Village records are not mentioned, and practically there is no examination of the village returns, while there is no system of entering details of mixed crops. He tells us further that "the forms in use for compiling the village crop returns are often marked by terrible mistakes. The preparation of the stock returns is most loose and casual." This being the condition of things, we are inclined to agree with Mr. Benson that the statistics of agricultural stock that exist, are of little use for preparing an agricultural analysis upon, and that they are therefore "not worth the paper they are written upon, and certainly not the labour expended in compiling them in the villages, the taluk, district, and Revenue Board offices." We further quite agree with Mr. Benson when he says that "it is not sufficient to prepare an analysis of each district and then to leave it, but we must provide for the maintenance of our information abreast of the time." We trust that it may, before long, be found possible to give effect to Mr. Benson's proposal to station permanently an agricultural inspector in each district for this purpose. The matter is certainly an important one.

There is no information on the subject of fodder reserves and arboriculture, nor about the reclamation of waste lands. If there are tracts of land where *reh* efflorescence exists, or other saline deposits, unfitting it for cultivation, an attempt might, we think, be made to introduce and grow thereon such plants as *Inga saman* (the Rain Tree), and *Albizzai procera* and *Lebbek*. The *Atriplex Nummularia*, or Australian Salt Bush, may be very well in its way, but we doubt if it will render saline soils *cultivable*. Nothing either has yet been done in the matter of diversified cropping, by which it was intended to ascertain whether the irrigable area of the presidency could not be extended, and whether the loss which the ryots now suffer by the destruction of their paddy crops, by attacks of insects or fungoid diseases, cannot be averted or mitigated by the substitution of crops other than paddy. We may, however, expect to hear more of this next year.

Mr. Benson gives us a short history of the Saidapet farm, which is now closed. The reason why this farm did not yield results such as to render them of use to the agriculturist of South India is explained by him. What with the unsuitability of the original site, its management being in the hands of amateurs, the founding of the Agricultural College and modification of the operations to suit the teaching of students therein, besides numerous and fruitless discussions continually arising on the subject of commercial and model farming, causing changes and stoppages in the work of the farm, all combined to prevent or delay any real start in respect to experimental work, such as is being prosecuted in all other agricultural countries where progress is being made. And now that the only farm of the kind in Southern India has been abolished, the difficulties in the way of experimental agriculture are obviously increased. Mr. Benson is of opinion, however, that the time has come when it would be possible to begin experimental work again. The decision of Government that this shall in the future be carried out with the aid of private individuals, does not fit in with Mr. Benson's ideas on the subject. He does not think it will be possible to find "substantial cultivators, able and willing to proceed with the real work of experimental research in South India agriculture, properly understood. The extreme slowness with which results accumulate in experimental agriculture is well known, for we have it on the authority of Sir John Lawes, that although he had been experimenting with wheat and barley for 50 years, he was yet not in a position to lay down any hard-and-fast rules for their cultivation to the best advantage. This being so, it is a matter of some surprise that Government should expect immediate results, and then find fault with Mr Benson for discussing their 'policy' regarding the abandonment of the Saidapet farm. The thing is done, however, and we suppose the Government will not be willing to reverse their policy in this respect. But it does seem a pity that an important matter like this should be relegated to chance, just when there appeared a hope of substantial results being obtained.

Exhibitions exercise a powerful influence in carrying the light of science far and wide, and it is therefore with some regret we note that, the past year was the third during which no Government agricultural function of the kind was held in the mofussil stations. Financial exigences, we are told, led to the withdrawal of the grant allotted for the purpose. A private show held in May 1885 by the Madura Farmers' Club was so successful, says Mr. Benson, that he hoped it might have been possible to establish it as a permanent annual institution, in future years ; but none was held during the past year. The ploughing matches and experiments with sugarcane mills yielded some interesting results, which we shall notice seperately hereafter.

There does not appear to have been much done in the matter of cattle breeding. But the establishment of central depôts for breeding purposes might be expected to yield some practical results in future years. The pony-breeding experiments in Coimbatore were not encouraging. Ensilage does not seem to find favour with Mr. Benson ; but the experiments now being carried out on a scale by selected officers, may be expected to supply valuable information. The total charges of the department, including the pay of the Director and the cost of the School of Agriculture, amounted to Rs. 57,698, and the receipts to Rs. 47,9 3, of which Rs. 42,311 represent the contribution from the surplus pound funds.

The Government 'Order' on Mr. Benson's report concludes as follows :—"They (the Government) would, however, impress upon the Director the desirability of the curtailment of the reports of his subordinates, which are, especially in the case of the Assistant Director, more lengthy than was necessary. The long account given of the stock in the Saidapet farm, for instance, was a needless waste of space : all that was requisite might have been given in a more condensed form. The same observation applies to the remarks on crops grown." We have always condemned unnecessarily long and elaborate reports, but in the present case we do not agree with the Government that Mr. Benson's report is more lengthy than was necessary.' Every thing relating to the Saidapet farm appears to be a sore point with the Madras Government, and perhaps Mr. Benson might, with advantage have curtailed his remarks regarding the live-stock on the farm ; but as to cropping statistics, we entirely differ with the view taken by the Government. We have

before us the last number of the *Journal of the Royal Agricultural Society of England*, which contains a report on the field and feeding experiments at Woburn during 1886, by Dr. J. A Voelcker, which covers 17 pages of close print. It bristles with statistics of every kind, and is, on that account, a most important and interesting contribution to the scientific and practical study of agriculture. We would recommend a careful perusal of the report to Mr. J. F. Price, and would ask him afterwards whether he still considers Mr. Benson's report on cropping 'a needless waste of space.' Some of the appendices might have been omitted, we admit, with advantage, but the statistical return of cattle disease in the Madras Presidency is a most important document, and its omission would have detracted considerably from the value of Mr. Mills' report.

GARDENING IN CALCUTTA.

XVI.

DESCRIPTIVE LIST OF FERNS.

(*Continued*.)

ASPIDIUMS.

Aspidium Germinyi,—This is also frequently grown under the name of *Lastrea Richardsii multifida*, and is undoubtedly one of the most distinct ferns in cultivation. The plant has fronds three feet high, including the stipes, which are about a foot long, numerously developed from a short decumbent caudex. The pinnæ are upwards of 4 inches long in the broadest part, and terminate in a densely fingered tuft of about 50 long, narrow acute divisions ; this peculiar characteristic gives to the plant a singularly elegant character.

Aspidium trifoliatum.—A very free growing Brazilian fern of very peculiar appearance. Its fronds produced from a succulent crown, are tri-foliate, the lower pair of pinnæ lobed on their margins, and all deeply crenate ; they are of a bright-green colour and grow from 1? to 18 inches long.

Aspidium macrophyllum—This grand and most distinct species from Tropical America requires a great deal of space to develop properly its beautiful pinnate fronds, which grow to about four feet high, and are of a beautiful light-green, hue.

Aspleniums.

This is a very extensive genus having representatives in almost every part of the world ; most of them are extremely easy to grow and rapidly make fine specimens. Nearly all the genus are either viviparous, with the upper surface of their fronds studded all over with young plants, or at least proliferous at their apex, producing at the extremity of each of their fronds one or a couple of bulbils, which later on develop into young plants. In either case, if it is desired to increase the stock of any particular proliferous or viviparous species, the parts of the fronds bearing the rudiments of young plants should be fastened down to the soil by means of wooden pegs, and kept moderately moist, when they will soon root and make plants, partaking of all the characters of the specimens which produced them

Asplenium caudatum.—A very fine species from Tropical America, producing from a broad fleshy crown an abundance of fronds of a cheerful light green colour from 15 to 18 inches in length ; they are pinnate, with pinnæ deeply serrated on their upper margin, whose their inferior part is perfectly smooth, the fronds have their at winged the whole length and are proliferous at their extremity.

Asplenium belangeri.—This handsome species is also known under the synonym of *A. veitchianum*. Its graceful feather-like fronds are produced from an erect caudex ; they grow to a height of about 18 or 20 inches and are bi-pinnate, the pinnules being narrow and linear, and of a pleasing deep-green colour ; they are besides proliferous on all their length.

Asplenium bulbiferum.—This fine New Zealand species is perh the best known and most universally grown of all the Aspleniums, it is of very rapid growth, and easy to manage. Its handsome pale-green fronds are produced in great numbers from a scaly, fleshy rhizome ; generally attaining a height of 18 to 24 inches. They are very proliferous, so much so in fact, that, although being naturally of an [illegible] habit, they are made quite pendulous by the great quantity of young plants to be seen upon them at any time of the year.

Asplenium ferulaceum.—A very distinct species from New Guinea and one possessing very little of the general appearance of a Asplenium. The fronds which are very minutely divided spri from the crown of a short stem making a miniature little tree fer they are broadly triangular, spreading, arched, or curved and ov —acuminate in outline, the pinnæ much divided and finely cut.

Asplenium longissimum.—This fine species from the Malay Peninsula is the best adapted of all the Aspleniums for growing in baskets of large dimensions. Its handsome dark glossy-green fronds reach from six to seven feet in length, and are produced in great abundance from a thick and slightly creeping rhizome, being an evergreen species the plant is well furnished at all seasons.

Asplenium nidus.—This is popularly known as the Birds-nest fern, from the remarkably peculiar manner of its growth. It produces entire fronds about 30 inches in length and 4 inches in breadth, which rise up from the crown leaving quite a hollow centre at their base, formed by the fronds, of equal breadth throughout, growing horizontally at first before taking up their upright course, thus leaving a large open centre. Native of India.

Asplenium nidus var Australasicum.—Although a native of New South Wales, this is probably only a variety of the preceding species from which it differs greatly by its fronds being of larger dimensions altogether, and of an elliptic lanceolate shape, instead of being of uniform breadth. There is also another point on which it is essentially distinct; the fronds instead of growing horizontally at first, taking an upright direction from the first start, so as to leave the crown elevated and exposed, thus making the hollow centre more funnel shaped.

Asplenium nobile.—A beautiful species from New Guinea with plumose fronds of a bright shining green, produced from a thick fleshy rhizome. They are quadri-pinnate, with pinnæ narrow but very symmetrically set along the rachis; they are when fully grown beautifully arched and attain a length of about 15 inches, and their feathery appearance is rendered still more striking by the quantity of young plants which literally cover the upper surface of the mature fronds.

Asplenium rhizophorum.—A highly decorative pendulous species from Jamaica, well adapted for basket culture. It is an evergreen species with fronds light-green in colour, almost triangular in shape, and whose extremity is lengthened out into a tail, bearing a young plant at the end, which roots freely when brought into contact with the soil or the moss of the basket.

Asplenium viviparum—This very distinct and elegant species is a native of the Mauritius. The fronds, which grow to about a foot in length, are very finely cut and of a beautiful dark glossy-green colour they are tri-pinnate and their upper surface is densely covered with young plants, which should be pegged down to the soil where they will root very freely.

DAVALLIAS.

This well-known genus contains many species of great interest, several of which thrive very satisfactorily in our climate.

Davallia elegans.—This very fine species is a native of the Malay Peninsula, and is no doubt one of the most beautiful of the genus Its rhizomes are stout, of a brownish colour, and produce a great abundance of tall decompoundly divided fronds of a rich dark glossy-green colour, very useful for cutting, as they last a very long time when kept in water.

Davallia Fijiensis.—A charmingly elegant ever-green fern free in growth, firm and durable in texture, and bright green in colour ; introduced as the name implies from the Fiji Islands. The fronds grow from two to three feet in height, and have a deltoid outline, the points of the fronds and the pinnæ being gracefully deflexed, they are compoundly divided, the whole frond being split up into lanceolate pinnules and pinnulets, and finally cut into narrow bifid divisions.

Davallia Griffithiana.—A very beautiful Indian species which grows freely in the Himalayas at an elevation of 3,000 to 5,000 feet, but is a very delicate subject in the plains, the thick fleshy rhizomes are covered with light grey scales, giving their extremities quite a silvery appearance. These rhizomes produce large spreading triangular fronds of thick texture, which in a young state are of a charming metallic hue turning later on to a pale glossy green. They are tri-pinnatifid, and their pinnules finely cut in proportion to the size of the fronds.

Davallia Mariesi.—A very dwarf species from Japan that should be found in every collection It is especially valuable as as a basket plant on account of its rhizomes being very slender, readily taking possession of the whole exterior surface, the fronds peeping out in all directions.

D. Mariesi cristata.—Is a very prettily crested variety, of the above species, rendered more elegant still by the tasselled extremities of the fronds and of their pinnæ.

Davallia Mooreana.—A well known species from Borneo. It is a plant of rapid growth, possessing the great advantage of making a large specimen in a short time. Its arched quadri-pinate fronds grow from 3 to 4 feet in length and from 18 to 30 inches in breath.

They are produced on underground rhizomes of moderate thickness, and borne upon slender pale-coloured stalks.

Davallia pentaphylla.—A dwarf-growing variety from the Malayan Islands. Its rhizomes are covered with a quantity of small brown scales very bright in colour. They produce pinnate fronds from 10 to 12 inches long, with pinnæ of a deep metallic colour when young, turning with age to a dark shining hue and of a leathery texture.

Davallia Tyermanni.—This very striking species is distinguished at first sight by its slender rhizomes which are densely clothed with large silvery scales. They produce, but rather sparingly, handsome deltoid tri-pinnate fronds, triangular in shape, about 8 or 10 inches in length and of about the same breadth at the base; the pinnæ are finely divided and a rich dark-green in colour.

DENNSTÆDTIA.

A small genus of strong growing ferns provided with creeping rhizomes which should always be kept underground. Most of the species are large and possess a bold and handsome habit. To grow them well they require a moist warm atmosphere.

Dennstædtia adiantoides.—This very ornamental species from Tropical America is of an exceedingly handsome and free growing kind, with very thick rhizomes producing in quantities its splendid bi, or tri pinnatifid fronds from 3 to 4 feet in length. These are of a bright green colour with obtuse pinnules, and have a very striking appearance on account of the *sori* being large and prominent.

Denstædtia davallioides Youngii.—A native of the New Hebrides of very robust habit and very vigorous growth. The creeping rhizome is thick and fleshy and produces fronds of noble proportions attaining the length of ten feet. The frond is beautifully arching, bi, or tri-pinnate, broadly lanceolate and acuminate. The aspect of the whole frond with its delicate divided pinnæ is very airy and graceful.

DOODIA.

A small genus of ferns generally very dwarf in habit, very delicate in constitution, requiring much care to cultivate them with success, they are especially sensitive to the effects of stagnant water, and should consequently always be grown in a well raised position.

Doodia blechnoides.—This is the largest species of the genus, and has been introduced from Australia. Its beautiful pinnatifid fronds grow from 12 to 15 inches high. They are produced from an upright short stem, and are broadly lanceolate and rigid, of a dark green colour, with pinnæ broadly ciliated on the edges.

Doodia media.—A very fine New Zealand species when young, the fronds which grow from 8 to 10 inches high, are of a light red tint, changing with age first to a metallic colour then to a dark green, they are lanceolate in form, pinnate, and the margins of the obtuse pinnæ are spiny toothed throughout.

RUS IN URBE.

Miscellaneous Items.

IT is stated that M. Monvault, a French weaver, is manufacturing carpets from the moss known as *Hypnum vulgaris.*

THE quantity of tea exported from China and Japan to Great Britain from the commencement of the season to the 2nd of June was 6,393,366 lbs. as compared with the 17,783,360 lbs exported during the corresponding period of last year. The exports to New York and Canada during the same period were 1,318, 689 lbs. as against 1,835,399 lbs.

NEW South Wales is one of the greatest sheep-rearing countries in the world. The increase during the past 25 years has been enormous. In 1861 the number of sheep was 5,614,014; now it is over 36,000,000. The exports of wool is about one-half of the total exports of the colony. In 1861 it was 12,745,900 lbs., in 1885 it amounted to 178,373,000 lbs., valued at £7,246,642. The tremendous fall in price is shown by the fact that, the export in 1884 was 173,986,000 lbs., valued at £8,953,100.

THIS season the mangoes in Goa, though late in ripening, have been unusually abundant: so much so, that Alfonso mangoes of the best kind were sold for a rupee and half per hundred, and of inferior kinds at ten annas per hundred. The fruit of the superior sorts is seasoned late in June, so that the mangoes under the name of Goa "Alfonso" that are sold in Bombay are generally of the inferior quality. Until railway communication between Bombay and Goa is complete, no mangoes of the superior kind can be procurable here.—*Bombay Gazette.*

THE central parts of Spain have been visited by so terrible a plague of locusts that whole provinces are ruined. Within the space of a few hours these pests destroyed every trace of vegetation, grass, wheat, vines, and olives. Over considerable tracts of country not a vestige of green is to be seen. In La Mancha the trains have been stopped by them, and gangs of workmen have had to go at end of passenger trains in trucks to clear the lines. In many cases the insects have lain so thick on the metals that, trains have not been able to travel faster than three or four miles an hour.

Selections.

AGRICULTURAL CHEMISTRY IN APPLICATION OF MANURES FOR THE SUGAR CANE IN THE ISLAND OF BARBADOS.

Being a Paper read before the Barbados General Agricultural Society, November, 18

By J. B. HARRISON.

Now, the aim of the majority of sugar cane manure makers, at the present time, appears to be to make mixtures of sulphate of ammonia and superphosphate, containing as large a proportion as possible of "soluble phosphates" and as little of potash. It is evidently no longer safe for us with sugar selling at $2 00 per 100lbs., to trust to ascertaining the manurial requirements of our plant by using only English manure makers' ideas; we must find them out for ourselves, and the principal part of the problem is to ascertain the proportions of phosphates and potash required for feeding the sugar cane, and the forms in which they are most acceptable to it as plant food This problem can be solved by ourselves, or rather by that portion of us who are proprietors, or attorneys. It can be done by laying down in the different districts of the Island upon soils of different character, and under different climatic influences, parallel experiments to those being conducted at present at Dodds; and if this were done we should approach the solution of two other questions one of which is also a financial one, viz, what changes do the manurial requirements of the sugar cane undergo under the influence of different soils, with stores of plant food differing in quantity and quality, and under different atmospheric conditions, and (most important of all agricultural questions) with what manurial agents, and in what quantities are the ascertained manurial requirements of the sugar cane in different soils, and under different climatic conditions to be most certainly and profitably satisfied? I do not, of course, at present advocate attempting to carry on experiments in the complete way in which I hope in future years to carry on our Dodds' ones, but in such manner that the planter shall ascertain the weights of canes produced, the volume and density of the juice yielded by them; which data alone can give us very much information; perhaps, practically speaking almost as much as more complete ones. The latter must follow when we shall have established that great want of this Island and of the whole West Indies, an Agricultural College, or preferable *station*, devoted to the study of the growth and requirements of tropical plants in tropical climates, and to imparting the knowledge so gained to the younger planters. I am myself convinced that far more success both socially and financially, will be attained by directing the studies of our youth to the phenomena of nature, rather than as at present, chiefly to the tales and traditions of the ancient Greeks and Romans.

I am afraid that the majority of those present will consider that I have dwelt too long upon the scientific portion of my subject, but I shall not apologise for having done so as the practical part of and its successful pursuit must be based upon scientific knowledge. I will, however, only allude to one more theoretical point and that is which ingredient if any of manures holds out the best promise of assisting us in growing canes richer in sugar than our present ones? Theoretically, there is one and that is an ingredient which you will begin to think I am harping upon too much—potash. In order to assist us in understanding this point clearly we must remember that in cultivating plants for food, our object is to cause the plant to draw from the air carbonic anhydride, and to assimilate the carbon contained in it by combining it with the elements of water to form starch, sugars, oils, &c. This assimilation is carried on by the chlorophyll, or green colouring matter of the leaves, and the relative proportion of this substance present may be estimated by the depth of the green. It has been proved experimentally that depth of green colour by no means necessarily implies a greater amount of carbon assimilation, and that it is associated with, and probably caused by, a relatively high proportion of nitrogen in the product. In chlorophyll, as in blood, a minute quantity of iron is always present,

and is, in fact, absolutely necessary for its production. When there is any deficiency in the mineral food of plants, a deep green may be developed by a purely nitrogenous dressing, and in this case we shall find that the production of chlorophyll is not followed in proportion by the assimilation of carbon, but that if we add the necessary mineral ingredients to it, although the deep green will not be so apparent, the assimilation of carbon will be very greatly increased; the decrease in the depth of green colour, or apparent amount of chlorophyll, being due, not to any real decrease, but to the amount of it, occasioned by the nitrogenous dressing, being spread over a far greater space, produced by the increased assimilation of carbon, and greater formation of non-nitrogenous substances. Vegetable physiologists have proved, by laboratory experiments, that the presence of certain ash constituents, and especially of potassium, is essential for the assimilation of carbon, no starch being formed in the grains of chlorophyll in the absence of this substance. In fact Sachs one of the highest authorities has said, "Potassium is as essential for the assimilating activity of chlorophyll as iron is for its production. As an increase in the proportion of sugar present in the canes would mean and could only arise from an increased assimilation of carbon, and since potassium is the dominant element for such increase it certainly appears advisable that experiments should be carried out in this direction by the application of increased proportions of potash salts. Very many planters chemists and manure makers, fear that an increased application of potash may lead to an excessive production of molasses as, however, the potash if absorbed in larger proportions will tend to accumulate in the portions of the cane where growth and assimilation is most rapid, I believe that whilst we may find the potash in the cane tops and leaves increased, the juice in the cellular tissue will be little if at all affected, and from certain facts in vegetable physiology I should not be surprised to find the percentage of potash in the cane juice diminished instead of increased by the extra amount applied. You will perhaps remember that I specially drew your attention to the large amount of potash contained in sheep and in pen manure; I will now ask those of you who have largely used the former manure whether you have ever noticed any increase in the production of molasses in cane juice from canes manured with it and also, whether you have not sometimes noticed such increase in that from canes grown with heavy dressings of manures consisting almost entirely of sulphate of ammonia and surperphosphate?

What are the practical points in the selection and application of cane manures we have arrived at, at present, from our theoretical reasonings this evening? The necessity of restoring to our soils, as far as lies in our power, certain of the mineral constituents, and the nitrogen which the crop has removed from them; and that this is most perfectly done by manuring the land before planting the canes with heavy dressings of pen manure, with sheep manure, or an artificial manure closely resembling them in composition. The points which we must bear in mind for our guidance in the selection of the latter are—that as the cane top, as planted, contains in itself a sufficient supply of nitrogen for its earliest stage of growth, we do not require a rapidly acting highly nitrogenous manure; that ammonia salts are not available as plant food to very young plants—in fact to them, if present in any quantity, they may act as plant poison; and that as nitrates would be lost by drainage long before the young cane plant had developed sufficiently to require them, the source of nitrogen in the manure should be mainly easily decomposable organic matter, such as blood, or dried flesh, and the percentage of nitrogen present need not exceed 4 to 4½. The phosphate should be in fair proportion, as any acidity in the manure must be most carefully avoided, a manure having, say, only from 12 to . per cent. of "Soluble Phosphates," and with rather high proportion of reverted and insoluble—preferably bone—phosphates should be chosen. This early stage is probably the best time to apply potash, and as I have pointed out to you that it is in pen and sheep manure, this should be in a relatively high proportion, say, from 5 to 7½ per cent. The model of such a manure is found in *Ohlendorff's Early Cane Manure*, a composition introduced here by the Anglo-Continental Manure Company last year, and which shows promise of becoming an established favourite with our leading planters. On certain estates in the northern districts of the island are found deposits of phosphate of lime in only a partially mineralised state, and also deposits of phosphatic marls containing from 5 to 30 per cent of phosphates. Where these are obtainable they should be reduced to powder and sprinkled on the pens in the manner in which I have recommended megass ash to be applied. Estates having distilleries should also do everything in their power to return the dunder to the soils, this being worth from 9d. to 1s. 6d. per puncheon as a manure. Where practicable it should be added to the pens and compost heaps. An excellent way of utilising this during crop time would be by running it in layers of about ... inches depth under the megass furnaces, where a large proportion of water would be evaporated away by the waste heat, and the red hot megass ash, falling into it, would crumble into fine powder. In this way a manure having very valuable fertilizing properties might be obtained. Where the stock is well fed, and pen manure made up and supplemented by the use of a suitable early cane manure, it will be found that in many cases no further dressing will be required; if however, the cane shows signs of falling off in vigour in June, July or August, then a light dressing of a good cane manure or of nitrate of soda, or sulphate of ammonia should be given. A very important point gained by the early manuring of the cane with suitable manure is that by so doing the healthy growth of the young plant upon which the future crop so much depends is ensured, and if a drought ensues in March, April, May, and June, it will be found that such plants will withstand its effects much better then the unmanured ones. A most important point also, and one I can scarcely impress upon you too strongly, is the very great mechanical improvement in the condition of the soil produced by pen manure and by vegetable green manures. The soils heavily manured by these become much more retentive of moisture which is a most valuable property in our climate, whilst the addition of the very large proportion of organic matter contained in the manures increases the amount of humus in the soil; and as the activity of the nitrifying organisms present (both those which oxydise ammonia into nitrates, so preparing it for plant food, and those which possibly occasion the assimilation of the free nitrogen of the air), depends in great measure upon the amount of this substance present, which apparently acts as food for them, the importance of such increase is evident.

Next we will consider the selection and application of artificial manure to be given in June, July, or August. As at this period of the year the cane has well developed its roots and is in a state of very active growth, we require a much more soluble and active manure than that used at an earlier period. It should contain rather a high proportion of nitrogen in a readily available form, either as ammonia salts, nitrates, or very easily decomposable organic matter I am not inclined to lay much stress upon the form of the nitrogen applied at this season, as at the temperature of this island, and in fairly wet seasons, nitrification ensues with great rapidity, and the ammonia salts are thus rapidly converted into nitrates whilst the organic substances are rapidly decomposed, and in turn undergo nitrification. So called organic nitrogen is frequently recommended for application at this period, as to some extent reducing the chance of loss of nitrogen by drainage; but if we recollect, even under favourable circumstances, organic substances in decomposing lose nearly 30 per cent. of their nitrogen in the free state, we shall perceive that the amount that may be saved by reduced washing and drainage is probably less than the amount thus lost. I do not consider that at this period of the cane's growth any great chance of the nitrates, formed or added, being washed in the soil below the range of its roots exists, where the manures are scientifically applied, unless under very exceptionable circumstances, and I believe that the experience of most of our planters will bear me out in this statement. The manure should contain a fair proportion of phosphates and potashes; one with a larger amount of the latter being chosen if the earlier manuring has not supplied it. In selecting the manure great attention should be paid to the fineness of its particles and their intimate state of admixture, as well as to the complexity of its composition; the regular and equable distribution of the manurial plant food at this season being of the very greatest importance. Avoid the mistake of throwing the manure into the cane bunch. It is useless there, nay, even injurious, until it has been washed into the surrounding soil. The young cane roots, by the extremities of which absorption of plant food alone takes place, are now away from the middle of the bunch, and are finding their food in the banks of the holes.

My next statement will, I expect, be received by the majority of you with incredulity; it is that in this island we more frequently over manure our canes (with artificial manures) than under manure them. Artificial manures have two classes of opponents; the first, a feeble one, those who do not manure at all; the second, a much more numerous one, those who over manure. You put to your canes at one dressing, say, 5 cwt to the acre of Mr. A's manure it does not give you as good a result as 3 cwt. per acre of Mr. B's, and you immediately jump to the conclusion that Mr. A's is not so good or so suitable a manure as Mr. B's, whilst the fact is that in the first case you have added so much soluble matter to your soil at one time that your canes cannot assimilate it; the soil water becomes too concentrated for the plant, which is thereby weakened and rendered liable to disease. Luckily, perhaps, a heavy rain comes and washes the excess away; your canes show signs of recovery, and you merely state that Mr. A's manure has scorched them. You do not notice

the money loss you have inflicted upon the estate by over manuring; but ask your attorney, if he is a good natured one to give you a little nitrate of soda or sulphate of ammonia to touch then up with—truly a case of "a hair of the dog that bit you," Chemical or artificial manures must at all times be applied with the greatest care. They should, preferably, be first thoroughly mixed with two or three times their bulk of dry earth, so as to facilitate their uniform application and distribution, and should be used in comparatively small quantities, say 2 cwt. at a time. You will get a far better return by applying any good artificial manure in two dressings of 2 cwt. each than in one of five, and you will have the additional advantage of saving some 12s, to 15s, per acre in the cost of manure. You may object that it will cost more to apply manure in two dressings than one. I reply that in this island labour is cheaper than manure; and would remind you that the Bridgetown Water Works Company do not pay you for the nitrates (invaluable to you, useless to them), which, by your system of manuring at one time, far beyond the requirements and assimilating power of your plants, you send into their water supply.* I am somewhat inclined to recommend in many cases the substitution of dressings of sulphate of ammonia, or of nitrate of soda, for any second dressing of chemical manures at this season, but have not yet had sufficient experience of its results to speak with certainty upon it.

I do not think that there are any further points in connection with the manuring of the sugar cane, to which I could with advantage draw your attention so late in the evening, and will therefore ask each one of those present, to assist in working out this manurial problem by at once criticising this paper and giving the meeting the advantage of their own experience. Let us all join in attempting to improve the scientific cultivation of the sugarcane, so that by the time we have Central Factories we may have larger and richer crops for them to reap; and last, but not least, that by being better able to compete with the beet-root we may restore her former prosperity to this island.

"Os Ammonite"—Cane Manure.

	Moisture	... .
a	Ammonium Sulphate	... .
b	Organic Matter	... .
	Sand and Silica	... .
	Monocalcium Phosphate	... .
c	{ Equal to Tricalcium Phosphate rendered soluble..	
	{ Reverted Phosphates	... .
	Insoluble Phosphates	... .
	Calcium Sulphate	... .
d	Alkaline Salts, &c,	... .
		100·00

a	Contains Nitrogen	... ...
	Equal to Ammonia	... ...
b	Contains Nitrogen	... ...
c	Assimilable Phosphates	... ...
d	Contains Potash	... ...

Ohlendorff's Early Cane Manure.

One hundred tons ex- "Atlantic," November 8th,

	Moisture	... 13·24
a	Ammonium Sulphate	... 8 42
b	Organic Matter	... 22 28
	Sand and Silica	
	Monocalcium Phosphate	
c	{ Equal to Tricalcium Phosphate rendered soluble	
	{ Reverted Phosphates	
	Insoluble Phosphates	
	Calcium Sulphate	
d	Alkaline Salts, &c.	
		100 00

*During the earlier months of the year the Bridgetown Water Works Company's water contains an average of 5 14 parts per million of nitrogen as nitrates, and during the months from July to December, immediately after the manuring season, 8·70, an increase of 3 56 parts per million. This means, for the Company's supply 87lbs. nitrogen, equal to 435lbs. of sulphate of ammonia lost daily, and if we assume that this supply represents as much as one-twelfth of the water lost from the island by drainage, we get a loss equal to that of 5,22) lbs. of sulphate of ammonia daily from July to December, as against 3,084 lbs. from December to July. Of this ext a loss of, in round numbers one ton per diem, much is doubtless due to over manuring and to the wasteful practice of ... fallow.

a	Contains Nitrogen 2·00 equal Ammonia	2 43
b	„ „ 2 06 „	2 50
a & b	Contain Nitrogen (total)	4 06
	Equal to Ammonia	4 93
c	Assimilable Phosphates	18·88
d	Contains Potash	8·34

Barbados Phosphates.

Dried at 212° F.

		No. 1.	No. 2.
	Organic Matter	7 21	1·24
	Sand and Silica	7 19	2·95
	Iron peroxide and Alumina	8·08	2 32
a	Phosphoric Anhydride	33 42	36·21
	Calcium Oxide	35 88	50·84
b	Carbonic Anhydride	2 37	6 36
	Alkaline Salts, &c., ...	5 85	·08
		100 00	100 00

Phosphatic Marls (not dried)

No. 1 contains Phosphoric Anhydride	... ·227	per cent.
Equal to Tricalcium Phosphate	... ·50	„
No. 2 contains Phosphoric Anhydride	... 3 33	„
Equal to Tricalcium Phosphate	... 7·26	„
Mo. 3 contains Phosphoric Anhydride	... 3·66	„
Equal to Tricalcium Phosphate	... 8·00	„
No. 4 contains Phosphoric Anhydride	... 3 76	„
Equal to Tricalcium Phosphate	... 8·21	„
No. 5 contains Phosphoric Anhydride	... 14·83	„
Equal to Tricalcium Phosphate	... 32 33	„

Samples of Dunder

		No. 1	No 2	No. 3
	Water	94 050	92·230	90·000
a	Organic Matter ...	5 030	7·400	8·270
	Silica	019	·020	·218
	Sulphuric Anhydride ...	·061	·037	·096
b	Phosphoric Anhydride ...	·005	·006	·198
	Carbonic Anhydride ...	225	051	·233
	Chlorine	·118	·036	·178
	Lime	·168	·059	·48g
	Iron peroxide	—	·061	·047
	Alumina	—	trace	trace
	Magnesia	·040	·033	·084
	Potash	·226	·060	·103
	Soda	058	·004	085
	Copper oxide	—	·003	trace
		100 000	100 000	100 000
a	Containing Nitrogen ...	·028	·024	·054
b	Equal to Tricalcium Phosphate ...	011	·013	·431

No. 1.—Dunder from molasses, value per puncheon 23 cts.

No. 2.—Dunder from rotten cane juice, value per puncheon 18 cts.

No. 3.—Dunder from molasses, skimmings, and cane mud, value per puncheon 36 cts.

Examples of a Manure of Complex Composition.

Detailed composition of "Dissolved Peruvian Guano," "Ohlendorff's" 800 tons, ex. "*Mary Hogarth.*"

Soluble in cold water.

	Moisture	9 058
	Sodium Chloride	1·540
a	Potassium Chloride	1.305
b	Potassium Nitrate	·085
c	Potassium Sulphate	2 689
	Magnessium Sulphate	1·464
d	Monocalcium Phosphate	15 570
e	Ammonia Sulphate	30·341
f	Organic Matter	·348

Soluble in Ammonium Citrate, Sp gr. 1·0g.

g	Tricalcium Phosphate	2 217
	Iron peroxide	·368
	Calcium Sulphate	20·285
	Magnesia	·172
h	Potash	·055
		1·188

Insolub'e in Water and Citrate.

Tricalcium Phosphate		·571
Iron peroxide		·101
Magnesia		·027
k Potash		·024
Silica		5,329
l Organic Matter		2,005
		100 000
d and *g* equal to Assimilable Phosphates		22 847
a, b, c, h and *k* total of Potash		2,367
a Contains Nitrogen.	·011	
e " "	6·440	
f " "	·170	
j " "	·636	
l " "	·167	
a, e, f, i, and l contain total Nitrogen	7 414	
Equal to Ammonia	9.00	

AVERAGE EXPENSES AND PRODUCTION OF A CUBAN CENTRAL SUGAR FACTORY.

WITH SOME ACCOUNT OF THE HABITS AND CONDITION OF LABOURERS ON CUBAN SUGAR ESTATES.

THE precarious condition of the sugar industry in almost every quarter of the globe has, for the last three years shaken every branch of the trade to such an extent that labour, money, and brain, may be said to be impotent in contending with the pressure of competition and of the excess of production over consumption, in combination with many other special circumstances peculiar to each and every country interested in the trade.

The planter of tropical and semi-tropical countries has been compelled to copy or imitate the more enlightened German and French producer. Science, conspicuously represented by the mechanical engineer, the chemist, and agronomist, has been summoned to the rescue and has responded nobly.

But it is not our aim just now fully to elucidate the present condition of the sugar industry in all its ramifications; we shall content ourselves for the present with pointing out what the sugar planter is doing in the West Indies Having ascertained that *he could not live* by pursuing the old methods inherited from his ancestors, he has, to some extent, studied the course adopted by the more enlightened and successful European beet sugar producer.

After careful investigation, he has reached the conclusion, that if sugar can be profitably obtained from cane, it must be by separat ing the cultivation from the manufacturing, and by the use of improved machinery and methods.

This now obvious fact has led to the establishment of the "Central Plantation Sugar Factory" system

The *Sugar Cane* has recently published some interesting letters and articles, showing the different methods and ideas prevailing in several countries. Some have accepted the system, others intend to follow, and we have heard of more that have rejected it.

Let us describe, in full, an average-sized Cuban central plantation sugar factory, of which we have just received a detailed statement.

This statement is based on the productions of 1.333 acres of land (40 Cuban "caballerias de tierra"), with a factory valued at $150 000, say £30,000, producing about 547,000cwt. of cane, or 38,250 cwt, (2,500 hhds.) of sugar from the factory.

This plantation ploughs and re-plants 8 caballerias (266 acres) of land every year, Upon an average the cane goes on reproducing for 5 years, and thus we get at the 1,333 acres, the extent of the estate.

(1) Four ploughmen and two boys, with 16 yoke of oxen, working 8 hours daily, will in 12 days get through 33 acres (1 caballeria). It takes, upon an average 4,500 arrobas (about 1,000 cwt) seed ca to plant the caballeria, or 33 acres. From these 40,000 to 60,0 bunches are expected to spring up, each with 10 or 12 canes.

(2) Fertiliz'ng is used at present to a very moderate extent up this p'antation. It takes about 900 arrobas or 22,500lbs. of fertili to every caballeria. Bagasse and brushwood ashes mixed w manure is all that is used for the purpose, but with splendid resu In ploughing, the furrows are made from 10 to 18 inches deep cane seed is covered with 3 or 4 inches of earth. In growing, cane will peep out of the ground after 15 or 18 days from time planting. In fertil'zing, each bunch of canes takes 1½ ounces of composition. Upon an average each ox produces daily about 30 lbs. of manure, which is mixed with 40 per cent ashes from the furnaces In four days 100 men will plant 33 acres of cane.

The work of weeding the cane fields is done during the non-grinding season, that is to say, from May to December. It is perhaps the most unpleasant work that the field hands have to do during the year. It is also the rainy season. The cane planting is done in the spring and autumn of the year, and sometimes by contract.

On the pla[illegible]n in question this was effected only partly by contract, so that the figures are not given.

Cane-fields in Cuba are weeded three or four times, from Ma to December according to their condition. The first work started when the canes are from 12 to [illegible]inches high, to prev the grasses from choking or overpowering them. One hund field hands provided with hoes weed a caballeria of 33 acres in 4 days. Twenty mules and thirty men provided with small plou or cultivators, will do in one day more than 100 men with hoes. When the work is by contract, the price fluctuates between $200 and $250, per 33 acres If the grasses are light it may be done for $250, or even less. On this plantation all three systems were adopted.

From about the 1st November all eyes and hands on the plantation and in the factory are turned to grinding operations; and from this date up to the middle of December, the cold weather and the dry season sets in, and has an almost magical effect on the cane fields The cane hardens, and excess of water in the cane disappears, the density of the juice being from 6 to 7½ Beaumé, which at this season of the year is considered fair. During February and March 9° to 10° is the minimum looked for, This year Cuban planters bitterly complain of the poor result as shown by the test. Probably the unusually heavy rains of January has weakened the juices or sickened the canes, The quality of the juice of the cane is a point which deserves more attention than planters generally give to it. Many planters ignore the fact that every degree, Beaumé, above or below, means 1/10 per cent more or less saccharine content, equal to 1/16 of a cent per lb. (or 3½d. per cwt) in the price of sugar, and over 50 cents in the price of each cart load of 2,500lbs. of cane. More attention should be given by planters to the selection of seed-cane. Now that all the cane is sold by weight and quality, the kinds that are best suited to their lands should be carefully studied, and experiments made. In Cuba ten different kinds of cane are well known to planters; yet but few take special notice of the kind that should be selected for planting. With the establishment of the central factory system those points will be forced upon their attention.

As has already been stated this central factory has 40 caballerias de tierra, or 1,333 acres of cane under cultivation; that is to say, the owner has 50 caballerias, or 1,666 acres divided amongst 20 planters, who in Cuba are called "Colonists." Each control 2½ caballerias, or say 83 acres, of which ½ caballeria, or 16½ acres are devoted to farm purposes for the use of the "Colonist." He has a house upon the farm, with 6 to 8 hands to do field work This represents 140 labourers living in 20 houses, who attend to the 50 caballerias of land in the non grinding season. These "Colonists" are provided with agricultural implements and stock, returnable on demand.

For two days before the grinding commences the cane growers are notified of the fact by steam whistles, which can be heard at a distance of three miles The cane weigher stands in readiness, with a Fairbank's platform scale.

There is no portable railroad on this plantation for conveying the canes to the grinding mill. The shape and peculiarities of the place not being adapted for it. It has only a stationary narrow gauge railroad from the factory to the main line, where the sugars are conveyed for transmission to the seaboard warehouse. Consequently, 36 wagons or carts, driven by two yokes of oxen each, are used for transporting the canes from the fields to the mill receiver, where the weighing takes place. These carts are very strong, but rather too heavy. They have each two very large wheels and no springs. They are constructed to carry 5,000lbs. or 2½ tons (S[illegible]) of cane, but from bad loading they only carry 4 250 lbs, or 2⅛ tons.

We will now see what is going on the cane-fields. Every hand is engaged cutting the canes with a cane cutter, which may be of American, English or German make, At the present time the English make, of the "crocodile's" brand, has the preference. A negro, or cane cutter, cuts the cane with two moves. With the left hand he holds the cane and with the right he first "tops off" the reed and the leaves, and next with a single stroke cuts the cane to within an inch of the ground.

If the cane is exceedingly long, he will cut it in two by a single stroke.

The reed and canes left from the cane equal about 10% of the weight of the whole cane.

A fair cane cutter will deliver, in a day of 10 hours, from 6 000 to 7,000 lbs. sound cane. One hundred cane cutters will therefore provide per day about 26,000 arrobas, or 290 tons for the crushing mill.

Following the cane cutters, in the field, are the "cane lifters"—generally women—who help to gather the canes into heaps, ready for the carts as they come round. To each cane lifter two cane cutters are assigned, sometimes three cane lifters follow four cutters.

As before mentioned, 36 carts are employed on this estate in carrying the canes to the mill. These make 4 trips per day, each drawn by two yokes of oxen, making, 144 oxen in all. At the Estate's cattle ranch about 60 bulls, oxen, cows, calves, &c, are kept to meet emergencies, and for herding purposes.

If each cart delivers, each trip, a load of 170 arrobas, or 4 250 lbs of cane at the mill, it means 680 arrobas or 17.000 lbs. per day. These 36 carts will deliver 144 loads, weighing 24,480 arrobas, or about 273 tons sound cane

The production of cane for the mill per caballeria of 33 acres varies greatly in Cuba, according to the condition of the lands, the system of cultivation adopted, and the weather.

Upon this plantation the average production is 62 000 arrobas, or over 523 tons of sound cane per 33 acres, and this is cut and carried to the mill in a little over 2½ days, by about 200 hands in all.

Before going any further, some particulars should be given of the difficulties which a sugar planter has to contend with in adopting the central factory system.

To find the needful number of honest hard working colonists is no small task, it takes time, money, and patience In a country like Cuba, which is not over-populated, where labouring men are somewhat scarce, tricky, ignorant, with set habits and ideas, it makes it difficult business for a planter to bring about any marked changes in cultivation or manufacturing, and, in fact, impossible for a planter who has not a sound financial standing, and a large stock of pa-

tience. In this latter case the best thing the planter can do is to demolish his manufacturing plant and confine his attention to cultivation only, and to dispose of his canes to the central factory.

In the case of the Central Sugar Plantation Factory of which we are speaking, it has taken three years to effect the change of system, and even now the work has not been in all respects satisfactorily accomplished.

The average "colonist" in Cuba has but limited means, if any at all. He has a family and wants a home, and to secure this he may accept all the conditions laid dawn by the owner. He starts working to satisfaction, but from the day he reaches the place he will go to the nearest store and try and buy provisions and other goods on credit, payable with the value of the production of the lands assigned to his use when the grinding season shall arrive. He will do as much work as will keep his credit at the store The storekeeper keeps a vigilant watch upon his movements. As long as he can manage to live from hand-to-mouth his ambition is satisfied ; in other words he is satisfied simply to exist; his only concern is to keep in with the storekeeper and his employer. His leisure moments are occupied in smoking or chewing, drinking, eating, and sleeping and this characteristic is more marked in the negro the in the whites, or Chinamen. The "colonist" is not the only part of the Cuban population which indulges in these habits.

A single field-working negro arrives at a plantation seeking employment. He is engaged, and after working steadily for two months he gets his wages, and then under any pretext, leaves a place to live for four months without working, at the nearest town, until his money is done, when he has to return to work again—and in the end his life is spent—a natural result from the system of slavery, for under it the negro worked and lived, as do horses—and now that he has obtained his freedom, it is not to be surprised at, if he is as unable to change his habits as a leopard can his skin ; another state of things will go on until some general and compulsory system of education is adopted, and then, and not till then, we may see, in the next generation, a great change in these respects.—*Sugar Cane.*

ERGOT.

PAPER READ BY MR. WILLIAM YOUNG OF BROCKLEY PARK, STRADBALLY QUEEN'S COUNTY, BEFORE THE CONFERENCE OF THE BRITISH DAIRY FARMERS' ASSOCIATION.

Mr. Young said:—I have been asked to read a paper before this Conference on 'Ergot'—probably because some letters of mine on that subject appeared in the agricultural papers last autumn.

I at first hesitated to respond to the request, as this is a Dairy Conference, and it would seem therefore that my paper should primarily relate to the effects of ergot on dairy cows. With this branch of the subject I have no personal acquaintance, however, and I can only open the discussion by giving my experience of the disease as it affects the grasses and its poisonous effect on sheep and lambs, leaving to others to give their experience of its influence in causing abortion among dairy cows. It seems to me however from the report in the Journal of the Royal Agricultural Society of England, of October 1886, by Dr. Johnston—in which he gives particulars of between 200 and 300 cases of 'Abortion in Cows,' which occurred within a small radius of Kirby Overblow, in Yorkshire, and which he directly traces to the presence of ergot either in the pastures or in hay—as well as from the letters of professor Fream on the same subject, that there can be no reasonable doubt as to the fact that, a large proportion of the serious losses which dairy farmers suffer from abortion is caused by ergot. In order therefore that farmers should be enabled to protect themselves from this scourge, it is first necessary that they should know what it is like, and be able to detect its presence in their pastures should it unfortunately attack them.

GRASSES LIABLE TO ATTACK.

Ergot is a peculiar spur-shaped fungoid growth which attacks the heads or ears of grain and grasses, taking the place of the embryo seed and rapidly attaining the spur-like shape, standing conspicuously out from the seed panicles, and being first of a dull lead-colour, darkening into purple or almost black. These ergots vary in size pretty much in proportion to the grain or grass seeds they replace—being largest and most conspicuous in rye In the grasses, it chiefly affects ryegrass, cocksfoot, holcus or Yorkshire fog and tall fescue. Of the latter grass (tall fescue) I hardly saw seed stem last August and September in the Queen's County or county Carlow which was not ergotised. This is a grass now much recommended for sowing in permanent pasture, but as it rapidly runs to seed, and is peculiarly liable to ergot, I think it advisable to pause before sowing it largely.

SHEEP SUFFERING FROM ERGOT.

My acquaintance with ergot in grasses came about in the following way; as though I had read of it, I did not think of examining into the question until it was forced on my attention last August: —Early in that month, on my return home from an absence of a few weeks, my shepherd, a man of large experience, told me that some of my lambs were dying and some ewes and lambs were ill, from a disease quite new to him. The symptoms were giddiness and partial blindness which seemed the first stage ; but this was distinct from the well known 'gid or sturdy' caused by hydatid on the brain for whereas, in the latter case, the sheep attacked always turns to the right or to the left, according to which side of the head the hydatid is on, these animals turned first one way and then another, and would run against obstacles or into water as if blind. The next stage is loss of power in the hind quarters, the sheep or lambs sitting on their haunches like dogs and if raised up soon resume the same attitude. This state is accompanied by crepitation under the skin of the back and hind quarters, as in black leg), and the animal gradually pines away and dies, the extremities in bad cases showing gangrene. Even if the attack be slight, and the sheep seems to recover it almost invariably relapses after a longer or shorter period, and eventually dies. The *post mortem* shows the brain and spinal cord affected, and a watery fluid all along the cavity of the backbone.

Now it may be said, how do I know that this is the result of ergot? I will tell you. A couple of days after my sepherd reported this new disease, I happend to read some articles in the *Farmers' Gazette* which, under the heading of 'Ergot in Grass,' gave exactly the symptoms under which my sheep suffered as those produced by ergot. I then described to my shepherd the appearance of ergot and sent him to examine the pasture on which the sheep were grazing when attacked, and in a short time he brought me a bunch of seed stems of several grasses but chiefly those I have already named *all thorough y ergotised.*

HOW TO DESTROY ERGOT.

This seemed to me pretty conclusive as to the cause. The next thing was to seek a preventive. On examining my pasture fields, I found that three of them all high lying, well drained fields, on limestone, had more or less ergot, and that some others had but little in the pasture but a good deal in sheltered places along the fences: I therefore at once removed the sheep, passed the mowing machine over the grass so as to cut all the seed's tems, and had them carefully raked off Also the ditch banks cleansed with the scythe. The disease then seemed to stop, unless in cases of relapse among animals that had already been affected and appeared to recover. Of course, as ewes are not pregnant at the time of year when ergot flourishes, no cases of abortion could occur.

BULLOCKS NOT AFFECTED.

My milch cows were fortunately on pastures where no ergot appeared, and though I grazed bullocks, both yearlings and two-year-olds, on the pastures on which the sheep were attacked, and though I afterwards gave them the seed stems which were cut and raked off and therefore full of ergot, it seemed to do them no harm. The lambs suffered most, partly, I suppose, because they are the weakest and partly from their habit of eating the seed stems of grasses more than other animals.

I may mention that I find the pastures much improved by passing the mowing machine over them, set high, so as merely to remove the flower stems. It serve the double object, if done in time of increasing the herbage and preventing ergot, and so preventing weeds from disseminating there seeds.

Having pointed out the effects of ergot on the grasses and on sheep stock, I now leave it to other gentlemen to give their experience of its effects on milch cows more especially as regards abortion

DISCUSSION,

Professor Fream moved a vote of thanks to Mr. Young for his valuable paper, and referred to the complaints which have lately gained currency as to the influence of ergot in producing abortion in cows. There had been a considerable amount of discussion as to whether or not ergot was so fruitful a cause of abortion as was generally supposed In his own opinion, it was undoubtedly a cause of abortion. Speaking of the development of ergot on grasses he said that it only attacked the grasses when in flower, and that it was solely confined to the panicle and never attacked the stem of the plant. He also strongly impressed on those present to study the appearance of the ergot on the specimens exhibited, so as to be able to recognise it when they saw it again, and thus help in spreading a knowledge as to its character, and possibly to its extermination. He also wanted to make known that it only attacked grass and cereals, and that only one or two cases are recorded in which it was known to effect rushes, sedges, or other plants. One thing, however was certain that it never attacked clover. It was found in hay as well as in grass, and in this state, was even more dangerous than while fed on the green grass, In silage it had also been found in several cases, and he did not consider that the heat generated in the silo or stack, was sufficient to destroy the germs or spores of the fungus. As far as he was aware, there was no top dressing or application that would destroy the fungus He thought Mr. Young's plan of mowing off the tops of the grasses the most practical that could be adopted.

Professor M'Nab gave an interesting account of the development of the fungus, beginning with the earliest stages of cell formation, and tracing its various changes until it arrived at maturity. He said the fungus attacked all grasses, and that even Poa annua (annual medow grass), to which Professor Fream made exception, was not exempt from its effects. It was, he said, very widely distributed, and he had no doubt that different species of it also existed. Its action in producing abortion, he attributes to an alkali in the composition of the ergot called ergotine, which he considers acts as an irritant He said the missing link in tracing the development of ergot was that they could not find when or how it attacked the grasses.

Colonel Curtis Hayward, said, he lost from 10 to 15 per cent of his calves each year from this sources though he could not find a single attack of ergot on his grasses ; while a neighbouring farmer whose grass was found extensively ergotised, had only a very occasional case.

Professor Long referred to experiments instituted by the French Government last year. Previous to the publication of the French experiments he was of opinion that sympathy had much to do with abortion, but since that time he was of a different opinion. After an extensive series of trials by the French scientist in putting cows which had aborted into the same house with pregnant cows, he never could produce another case amongst the healthy animals. He urged the necessity of calling the attention of our own Government to this important subject of ergotism and abortion.

Professor Carroll said that he had frequently observed swarms of insects crawling about on grasses at the time of flowering, and fully believed that they were one of the principal means by which ergot

was transferred from one plant to another. As to the best method of getting rid of it, he considered that much could be done towards its prevention by good manuring and high farming. In support of this view, he said, he often noticed along the boundaries of a field where the grass was thin and weakly that it was badly ergotised while in the centre of the same field, where growth was rank and luxuriant, there was no appearance of the fungus.

FOREST FIRES.

TO THE EDITOR.

SIR,—Replying to "E," in your issue of the 9th instant, I should very much like to hear more of the forest he refers to, as showing fine and young pure growth in spite of a yearly fire, and shall be much obliged to him if he will give details in the *Indian Forester*.

GUM GRANGE.

TO THE EDITOR.

SIR,—As I have lived among or near pine forests for about forty years off and on, perhaps Mr. Hearle will not mind my trying to meet his arguments In the first place, has it really been tried fairly whether yearly fires destroy the greater percentage of seedlings? Mr. Hearle says that the *Pinus longifolia* forests in Jaunsar that "have been protected, although they have been burnt on more than one occasion, still show a marked improvement on the neighbouring unprotected areas." Has it really been accurately determined that this improvement has been caused by having a few more fires in the unprotected than the protected portion, or by indiscriminate destruction of trees for timber? The mountain valleys must at least for the past century, if not longer, have been as thickly peopled as now, less the usual percentage of human increase. Their wealth—when the hills were less open to the plains than now—consisted more in their flocks and herds than in their crops. For the cattle the fires were lit yearly, yet good forests stood everywhere till the location of cantonment and sanitaria raised the demand for timber and firewood to an unprecedented extent. Then forests began to disappear. There were indeed previously many mountain slopes—generally overlooking villages—quite denuded of timber, while the slopes adjoining were in many instances still forest clad. This was caused by fires certainly but fires lit *after* every tree had been felled for the express purpose of leaving the hill bare of trees to aid the growth of grass required during the long winter as hay for the cattle. Where *chir* forest prevailed this was not so necessary owing to the fact mentioned by Mr Hearle that the trees generally do not grow in dense masses; while the blue pine had to be cut away entirely to ensure a good growth of hay. And as their timber is so much more valued than than of *chir*, the blue pine and deodar suffered most when contonments were started

That fine trees were burnt very often by yearly fires is true, but the cause was generally that scarcely a good sized tree was uninjured, owing to the reckless habit of villagers of hewing out torches from the sides of the finest tree thereby leaving two or three square feet of wood exposed and cut, from which long streams of turpentine rolled to the ground up which the flames rushed and ate into the very heart of the tree. Can fires be controlled? Mr. Hearle asks. Why not try it and the seedling experiment at the same time? Taken an isolated patch of, say, ten acres, have every dry leaf brushed away with thorny bushes and cut the grass. Leave it till next May, then set fire to it against the wind. Have half a dozen native boys ready with green boughs to control it; and after it has burnt off, see if seedlings have escaped or not. When we consider the enormous areas under pine forest and the cost of controlling and replanting these, of course it is staggering. But I alluded to the particular forests near Murree. They lie generally along the upper slopes and crests of parallel spurs of mountains, the valleys between being clear of trees and cultivated. The huts of the villages are not, as a rule, in groups, but scattered in twos and threes to the very verge of the forests and even lie within the *protected* but non-reserved forests touching on the *reserved* ones. If fires could be prevented as cutting can of course the results would be excellent. But what is to be gained by protecting seedlings for a few years if uncontrollable fires must inevitably follow and destroy seedlings, parent trees and all as has been the case in Murree despite the thickened bark? This thickened bark which the trees have developed will certainly protect the trees from yearly fires that never rise above six inches in height; but when the flames rise six and eight feet the lower branches which have their bark are first shrivelled by the intense heat then catch fire and communicate it rapidly from bough to bough till the top is reached. Meantime whole branches are whirled across twenty and thirty yards into the midst of the tinder awaiting the flames farther on. Stone walls or ditches could control small yearly fires, but the only method by which large fires could be localised when inevitable that I can think of is by having broad clearances made clean across the forests. Transverse bars, denuded of trees and kept fairly clear of grass and leaves would certainly be practicable in the Murree forest and in most of those lying on the lower slopes of the Himalayas This might be worth trying if yearly fires are condemned after careful trial. The breadth of clearing required would, of course, depend on circumstances, or perhaps "Gum Grange," could tell us how to do it scientifically.

—*Pioneer*.]

SUGARCANE CULTIVATION IN THE PUNJAB.

SUGARCANE is cultivated in India pretty extensively. The varieties are numerous—from a thin reed, light red coloured and sapless, about as thick as a man's finger, and 5 feet high, to a coloured but juicy and succulent cane, as thick as a man's arm, and 10 feet high. The common kind, cultivated in the neighbourhood of Bhot, near Sialkot, in the Punjab, is a green, or pale yellow kind, of medium size.

Imam Din, or Imam-ud-din, Zemindar and malee, who supplies vegitables to the *Sahib og*, and who cultivates sugarcane also, has furnished me with certain details connected with the cultivation of sugarcane Here they are :—

"Sugarcanes of last season's growth," said he "are put in plots of ground and allowed to remain there until the bud germinates" To illustrate his meaning, he took up a piece of the cane, and after removing the decayed outer leaves, pointed out the buds at intervals along the cane; a bud at each knot. "Two months is the time during which the bud is allowed to germinate thoroughly, before being transplanted. The cane is then dug up, and cut in lengths of about half a foot each; two knots with their buds sprouting from them are usually a set. Actually, cut of each set two distinct canes are grown. These sets are put into prepared soil, a little earth is scraped over them, and there they remain for nine months. The cane is then ready for cutting."

A good deal of the sugarcane when partly grown, is cut in its green state, and is used for feeding cattle. Government use a lot of it for feeding their elephants, and its cultivation in districts where Government elephants are kept is a fruitful source of profit for the cultivator, who no doubt gets a better price for it in this manner—even with the contractor as an intermediate agent—than he would derive from it under the ordinary gur-making process. Yet the major portion of sugarcane grown in India is devoted to the making of *gur*, or unrefined sugar, and is used in its raw state as an article of food by the natives.

The following is the process by which the cane is converted into *gur*. The cane is cut down with a kind of chopper; then taken to the nearest *babri*, or crushing mill, for the purpose of having the juice extracted. There are several kinds of *baleri*. One a kind of wooden beam with an ironshod boot, this boot moves in an iron socket and is drawn round by a pair of bullocks The canes are put into the socket, are pressed by the boot, and the juice thus extracted runs out of a bamboo pipe into earthenware vessels.

Another kind of mill is of two rollers placed perpendicular and close to each other, worked by a pair of bullocks. The cane is passed between the rollers, and the juice thus crushed runs out into a trough below. These are the ordinary mills of the country, primitive arrangements that must give away to the improved machinery of modern times; but, as yet, many of the villagers of Bhot have not even heard of their being improved on, and these evidently answer their purpose well enough at present. Imam Din took me round to the hut where the juice of the cane was being boiled, and informed me that this work was performed by the *mehther* caste only. He admitted that he himself, and his people—who are all good Mahommedans—will plant, reap, and take part in the squeezing out process, will even eat the boiled *gur* that is made from the sugarcane juice; but boil it, never! That's the *mehter log ki kam*, and to them it is life.

In the hut I found an old *mehtrani* sitting over a large pan or *kurrah*, busily removing with a ladle the scum as it rose on the boiling juice. This she puts into a *gurrah*, and this scum is I believe the peculiar *huq*, or perquisite of the sugar boilers. Imam-Din, good Mussalman that he is, could never think of eating this, Seeing it as it stood there in the *gurrahs*, a filthy mass, there is good reason, one would think, besides caste prejudices, to excuse Imam Din and his people from indulgence. While the old woman is employed removing the scum, one of her caste *bhais* is busy feeding, with dried sugarcane pith and leaves, the *chula*, or fire-place, over which the *kurrah* is set to boil. Each *kurrah*, in Imam Din's sugar-boiling hut, would hold about 12 to 14 gallons of juice, and the usual outturn of *gur* from one of them is two maunds per diem.

Much of the sugarcane in its uncrushed state is eaten by the natives. The casual observer will notice large heaps of sugarcane for sale in the bazaars. On enquiry he will find that it is sold from one pice for two small canes, to one pice each for the larger sizes. He will also notice at certain stalls pieces of sugarcane denuded of bark, and cut into pieces about one inch in length. The whole sugarcanes are for the ordinary native who, depending on his good teeth strip and chew it, and his wind to suck out the juice after; is content with this kind. But for the *Baboo logue*, and Anglicised schoolboys with effeminate ideas and inferior teeth, to these and the teethless old men and women, is the ready cut sugarcane a boon

Who that has lived any time in India that has not noticed—in the months of October and November, when the surgarcane is ripening—quantities of sugarcane pith heaped or scattered under favourite halt trees at serais, in Railway station platforms, or any of the many places where natives do congregate, and where the excellent sugarcane has helped to sweeten their converse.

Sugarcane juice is capable of being converted into several kinds of useful articles, such as vinegar, syrups, sugarcandy and loaf-sugar, and last, though not least, a kind of arrack which Imam Din knows how to make, and of the making of which I am promised the details some day. I may then perhaps, be able to let you know the secret.—"J. J." in *C. and M. Gazette*.

OF GRASS-CUTTERS.

Excepting down in Lower Bengal, Assam and Bombay, where grass grows luxuriantly and where the sickle is required to cut it, the *koorpa* is the implement used by the grass-cutter throughout India generally. For the luxuriant growth of preserved grasslands in cantonments and rukh lands and on railway embankments, the sickle is also requisitioned, but for cutting grass of which the roots from the bulk, the *koopa* is essential. We are all familiar with the sickle, but the *koorpa* may require a little description here not because it is an unfamiliar object—nothing of the sort—but its associations with so humble an individual as the grass-cutter may have left it overlooked. It can be briefly described as a piece of iron about 8 inches long, 4½ broad and about ⅜ to ½ an inch thick; one end of which is broadened and made sharp for cutting up the grass roots the other end being spiked and fitted into a wooden handle. *Koorpas* are made out of old wheel-tyres axles or indeed any piece of iron capable of being wrought and are of various sizes; the dimensions given being the average. The young grass-cutter has a diminutive weapon made for him which as he advances in years, is replaced by a heavier one, until he is able with increasing strength, to handle the "regulation" *koorpa*. Economic reasons often weigh with the grass-cutter in selecting his *koorpa*. For instance, I asked Shaddan one day why he used such an unwieldy *koorpa*—his particular *koorpa* weighing at least seven pounds. His answer given readily enough was that it would last all the longer, and as he happened to have secured a good piece of iron, he got Boor Singh the Sudder *lohar*, to make him the *koorpa* in question, and as it was getting less in size every day with constant use and sharpening, it would in a few years, be of comfortable dimensions. Shaddan showed me a *koorpa* once his grandfather's, now a small stump a few inches long. This Shaddan, had rehandled for his son Thiria, who, he said, was learning to use it pretty well, and for whom some fine day he would have to get another one, when it would be handed over to a still younger son. Thus, you see that the *koorpa* is made in the first instance, by the grass cutter, of serviceable but unwieldy size. After a few years it gets gradually smaller when he hands over the now short stump to his son to practise grass-cutting on. When the *koorpa* is no longer serviceable for cutting up grass-roots, the handle is taken out and the spiked end driven into the wall of the grass cutter's hut, where it serves as a peg for hanging the grass net on. There is some ingenuity displayed in the making of *koorpa* handles. The main object seems to be to have a slight bend in the middle, this bend gives the needful fulcrum, enabling the grass-cutter to root up his grass more readily. The grass-cutter's *koorpa* is as essential to him as the curry stone is to a *bowarchi*, or a stick to a *chowkedar*; and it is always carried ready to chop up any tuft that may offer. *Koorpa* seem to vary little in appearance throughout India. Another article comprised in the stock-in-trade of the grass-cutter is the *kanta*, a forked branch of the *babul* or *peepul* tree—an article about one yard long, fork and all. This is used by him for beating out the soil from the roots of the grass.

The *jhola* or net completes the three articles required by the grass-cutter, and is an ordinary twine-made net, capable of holding a maund or so of grass.

To the grass-cutter, the monsoons are a godsend indeed; for then the grass sprouts up and he can with little difficulty cut from two to three maunds a day. It is after a long drought that the grass-cutter finds his work arduous. He not only finds it difficult to collect his maund or two daily, owing to the scarcity of grass; but has often to long distances—in some stations 14 or 15 miles—to rivers, the moisture from which preserves a little succour for the grass on its bank. Where rivers are out of the question, the grass-cutters are sorely tried. One may see them on the parched and arid plains trying to get a few tufts of grass on the shady side of *nullas* and mounds, or furtively stealing round villages where the moisture from irrigation permits odd tufts to spring up on the borders of tobacco, pumpkin or other vegetable plots. The grass cutter often, in his incursions into these preserved lands, is laid hands on by the villagers, and it is only owing to his speed of foot that many fatalities are averted. The grass-cutter, knowing well he is on forbidden ground, soon "makes tracks" when he sees any one coming. The commotion caused by the event of a grass-cutter being pounced on by the villagers is ludicrous in the extreme —men, women and children, with the usual accompaniment of pariah dogs, all howling and yelling after the unfortunate runaway as he makes off with his pound or two of grass slung over his shoulder, and his pigtail flying behind him. The grass-cutter is not always so lucky as to escape unscathed, and many a man can show you marks of these encounters. He will also smilingly refer to his sharp *koorpa* as accounting for many a vicious cut made at his would-be capturers. Thus passing through many vicissitudes, the unfortunate grass-cutter, after a long day's work, lasting often from 8 A.M. to midnight, tired, worn out and hungry, has earned the miserable sum of four to six annas, out of which, he has to keep his tat and family too, if he has got one. No wonder, under these circumstances, the grass-cutter has recourse to the reprehensible practice of damping his grass. On his return from his day's work the grass cutter, who has to be careful of his hardly accumulated gathering takes it into his hut with him to keep it secure; previously giving it a dash of water. Naturally, grass so subjected gets fusty through being kept in a closed hut all night and is scarcely calculated to keep animals in good condition. In the early morning the grass-cutter is up betimes, and gives his grass an extra dash of water to "liven it up."

He will tell you, of course that its dampness is due to the moist nature of the soil on the river-bank where he cut it yesterday. Now from this practice, as well as the fact that grass-cutters are in the habit of grubbing up grass from delectable spots, where dead animals have been thrown out to rot, it may be assumed that the grass-cutter's only care is to get his quantum of grass as best he can. He considers not that the animal may have died from anthrax, fever or other malignant and infectious diseases; or that some millions of the bacteria spore of germ of the disease may be carried in by him in his bundle of grass. But you who employ him find your horses die from anthrax, or pleuro-pneumonia. If you command a regiment of cavalry, your horses are reduced by a troop or two, if you don't lose half your regiment in the event of Mr. Grass-cutter cutting up those luxuriant tufts over the last resting place of zemindar Mahomdu's favourite mare, who, it seems, one day refused her usual feed of *goor* and *chunna*, swelled up about the head, ran from eyes and nose for a day or two, and died. *Wah! Wah!*

The wretched brutes one sees at the end of cavalry troop lines, or outside grass-cutter's huts, feeding on the modicum of grain which Government have ordained the grass-cutter must feed his tatoo are, to say the least of them, a disgrace to humanity. They are weak, attenuated, sore-backed brutes, cow-hocked, with their four knees knocking together in such a fashion as to impress one with the idea that they are about to double up altogether. Notice these brutes, as they start off on their day's work about 8 A.M. bestridden by the lanky grass-cutter, with his *hubble-bubble* alight; or as they come home late at night laden with grass, and with the lanky grass-cutter still on the top, labouring along, stumbling every other step from sheer debility, and judge for yourself if such a system is creditable to us. But it may be asked where is the remedy? The answer is to have carefully selected gass lands well irrigated, whence you can ensure a plentiful supply of grass all the year round. With these and a few fields of lucerne you can make up a comparatively laxative fodder which will counteract the foul and flatulent, though nutritious *chhunna* on which you feed your horses as a rule. Surely, wherever Government have cavalry or cattle of any sort, they can enclose a piece of land for grass production as well. They can do this for parade grounds and cantonments; and, the civil portion of the community, having regard for sound wholesome grass crops, can manage to do likewise. It remains in this nineteenth century to be recorded that a powerful Government with an unlimited exchequer, allow their cavalry horses to die from contagious and infectious diseases; their men from diseases brought on from drinking impure milk and eating unsound and diseased meat: and all because no one will take the trouble to select good grass lands.

The grass-cutter is about the most miserable and hard-worked mortal, employed under the benificent *Sarkar*, and his state requires looking into, not only on his account alone, but with a view to lessening those outbreaks of anthrax, &c., that are, in the main, caused through horses being fed on infected grass, an annual loss that would more than cover the most elaborate and secure grass scheme that could be devised.

It is feared that there is less known than there should be about the grass cutter and his works generally.—J. J. in *C. and M. Gazette.*

WHAT ENSILAGE WILL DO.

Many a good cause has suffered from the over zealous and indiscreet advocacy of its friends, who by making claims in its behalf, which experience does not warrant, and will not bear out, tend to disgust those who otherwise would look favourably upon it. The ensilage interest furnishes an illustration of these extravagant claims, and it will be a wonder if some are not deterred from adopting it in consequence. As an example of them we take the following from one of our exchanges.

"The noted breeders of Jersey cattle, Messrs. Miller & Sibley, Pensylvania, have experimented with all manner of foods for cows, and find that for economy ensilage overlays all else. They find they keep as many cows from twenty-seven acres of land devoted to ensilage corn, as they formerly did on one hundred and twenty-seven acres of meadow land, and their cattle do well on ensilage the year round, better than they do on the pasture of the average farm. On sixty acres they can keep one hundred cows in forage during the year, and in a thriftier, healthier condition than on any other forage they have tried, and at a cost for the forage of only twelve dollars per head."

Here the claim is made that land devoted to ensilage corn will keep almost five times as much stock as if devoted to hay, and that they can keep almost two cows per acre, and at a cost of only twelve dollars per head per year. Now, ensilage has real merits enough, when fairly started, to commend it to the intelligent farmer and especially to dairy farmers. Let us see what a fair statement of the facts in the case will warrant. Land in good enough condition to grow 60 bushels of corn per acre (and no good farmer should be satisfied with less) will grow twenty five tons of ensilage with the same preparation of the ground and cultivation. It is now grown in drills 3½ to 4 feet apart, using not more than 12 quarts of seed to the acre and matures a considerable amount of ears, and is not cut till the ears and stalk are pretty well matured.

Such ensilage has been found to make a good milk ration for cows when fed with bran, on hay or any forage being used. H. B. Gurler, one of the leading dairymen of northern Illinois, in a Farmers' Institute speech, reported feeding tests made by him on milch fideration of 80 pounds of ensilage and 12 of bran, and that the cows in every respect—in quantity and quality of product, and in health and condition—did just as well as those receiving the same amount of bran, but half the amount of ensilage, hay, or dry corn fodder making up the balance of the ration. Now let us do some figuring on this matter. The 25 tons of ensilage which we should raise on an acre will feed a cow a daily ration of 80 pounds for 625 days, or, allowing for some shrinkage in silo, for 600 days; or two cows, their ensilage ration for 300 days, or through the entire milking year, except when dry, for which we will allow 65 days. Each cow in the 300 days will consume 12 tons of ensilage, which at $1 00 per ton in silo costs $12 She will in the same time, with a bran ration of 12 pounds per day, consume 3,600 pounds of bran, which at $12 per ton is worth $21 60. Which added to the cost of the 12 tons of ensilage makes $33 60, as the cost of keeping the cow a year. But the cost of the bran is nearly returned in the value of the manure made from it. Allowing for this and also for the value of that made from the silage, it will reduce the net cost of keeping to but little more than $20 per year.—*Farmers' Review.*

GAME LAWS FOR INDIA.

On the principle that half a loaf, or even a much smaller part of it, is better than no bread, we ought perhaps, to accept the Game Protection Bill just introduced into the Legislative Council, with thanks. The Hon'ble Mr. Pelle, by whom the measure was brought forward, was very careful to explain, having dim visions probably of awkward questions in the House of Commons, that Government has never entertained the idea of adding the "poacher" to the criminal classes in this country, and that the object in view was not the protection of private property in game, but the protection of the wild creatures from destruction in the breeding season. This object, accepted as a desirable one, we cannot but think that the conclusion at which the Government of India have arrived is scarcely logical, and it is certainly much to be regretted. It is held that, although opinions differ "there is no strong case for protective legislation of a general kind." This conclusion will be a great disappointment to the many who hoped that a Game Protection Bill meant something more than an attempt to legalize the practice now prevailing in many Municipalities and Cantonments in the Punjab, of prohibiting the sale of game during the breeding season. This practice, we are told, would have to be discontinued if it were not made legal, and hence the necessity for legislation. Let us be grateful that we are to be allowed to retain what we have got.

But, really, is it not time that Government should take the matter of game preservation seriously in hand, instead of merely playing with it in this way? We are curious to learn what the evidence is on which the conclusion is based "that no strong case for legislation of a general kind" has been made out. The attempt to attack the general question through Municipal and Cantonment law, appears to us to be radically wrong. What possible interest can a Cantonment, or Municipal Committee, except, as representing a section of the general community, have in attempting to stop the destruction of game? We are told that there is no intention of interfering with *the unlicensed sportsman on his shooting grounds.* We may observe that the language here used is quite unintelligible to us. If the *unlicensed sportsman* means the sportsman who has no license, as it clearly ought to, we believe that the Police are in the habit of pursuing such an individual at all times and in all places, and that Magistrates are in the habit of sentencing him to fine and imprisonment. If the word unlicensed is merely a general term, and that what is meant is the *sportsman* (?) who kills game out of season, then we may mention that shooting licenses usually contain a clause to the effect that game is not to be killed in the close season. But what would appear to be really wrong in the expression is the word *shooting*; and that the intention was to disclaim the idea that the Bill was directed against the *Sportsman* (save the mark!) who employed any other means of destruction than powder and shot. To say the least, the language is unfortunate But apart from this verbal criticism, it will be clear to the meanest intellect that, to prohibit the sale of game in a Municipality, is, practically to pursue the "unlicensed sportsman on his shooting grounds" by stopping the demand for game at certain seasons, unless, indeed, the unlicensed sportsman goes on killing out of pure cussedness.—*Civil and Military Gazette.*

DEATHS AMONG INFANTS.

Contrary perhaps, to the popular opinion, whooping-cough annually causes thousands of deaths. This high mortality may be accounted for by the fact that the disease lasts so long that the parents often become careless, and so eventually see their little ones die from "debility, pneumonia, bronchitis, bowel complaint, or some complication caused by the great straining induced by the cough." Diphtheria only causes (according to the last U. S. Census Reports) a little over three times as many deaths as whooping-cough." Of all the diseases with which I am acquainted, the most frightful in its mortal inroads on infant life is the summer diarrhœa of infants. There has recently been a discussion on summer diarrhœa in one of the leading journals on infantile diseases, and in one of the papers dealing with this subject we read as follows:—

"Many years ago, the late Mrs. Richmond, a woman of remarkable energy, though carrying about an incurable disease, conceived the idea of establishing the New York Infant Asylum. She succeeded in obtaining a charter and pecuniary assistance. A building was fitted up at Woodlawn, on the banks of the Hudson, a part of the Island free from malaria and sparsely inhabited. The atmosphere seemed as pure as anywhere in the country, and cows to furnish milk for the infants grazed in the pasturage around the house. One hundred and fifty cribs were provided, and the house was opened with the admission of twenty-three foundlings, mostly under the age of three months. Any one who has had experience with the feeding of infants in New York [or London] might have foretold the result. The infants were all bottle-fed. They became fretful, had diarrhœa and vomiting, wasted away, and one after another died. The institution was apparently *required*, and foundlings were brought in almost daily, but the warm weather was coming on and the new recruits shared the fate of their predecessors. They died, as the many post-mortems that were made showed, from enterocolitis. The 150 cribs were never filled, and seldom more than thirty of them Mrs. Richmond exerted herself beyond her strength, but all to no purpose. These infants, at such an age, could not live during the warm weather on cow's milk, whether mixed or not with farinaceous food. *The deaths kept pace with the admissions*, and the philanthropic founder of the institution became extremely despondent at the result. Afterwards better counsel prevailed, and now in the same asylum every infant under the age of twelve months has breast milk, and the mortality during six months is not greater than it was in half a month during the time alluded to. Diarrhœa among the wet nursed babies of the institution is now rare.'

"Several years ago the writer was attending physician to an institution for homeless children and foundlings. At that time the idea of partially peptonising cow's milk was unknown. Hundreds of homeless little waifs were brought to his place, but they never went out alive unless kind friends adopted them. They were carefully watched and nursed by the most competent of nurses; but during a long experience in this asylum not one newborn infant brought into it was ever reared there. No matter how plump and promising the babes were at their advent, in a short time their little hands began to wither, their faces to wrinkle, and soon they presented the shrunken, decrepit, 'old-man-like look' that the pinched features of a wasting infant always have. The asylum was not a home for these little ones, but a place where they were sure to die. The best infant foods were tried, but in vain. Plain cows' milk was given, but it made no difference. Every possible measure was resorted to, but the end was death. And let me say, after an experience of years in doctoring infants, to all who are feeding their infants on many of the 'baby-foods,' so called, that every asylum using these loses all its children. In the New York Foundling Asylum every effort is made to employ wet nurses for the foundlings, but a considerable number are necessarily bottle-fed. These are placed in a ward which is known among the employés of the asylum as the ward of the '*dying* babies.' In all truth it might be put over the doors of such houses—'All hope abandon, infants entering here.'

"Let it be once understood among our philanthropic societies, and among those good spirits who devote a large portion of their time and means to bettering the condition of the children of men, that the words of the *dying babies* engirdle the earth, and bountiful hands and loving charitable hearts will provide homes for the homeless, which shall be the complete and perfect embodiment of the recent grand advances of science—homes that shall mean homes in very truth, and not places of inevitable death.

'Last week I read in this journal the article headed, 'Eight Remarkable Cases.' It was one of the most remarkable reports I have ever read. Why, every one of the cases there reported die under ordinary feeding. I thought in reading it, of my own recent favourable experience, which coincided with all it said, and I said to myself, 'Why doesn't some good heart, more plentifully endowed with this world's riches than his or her needs require, erect, like Mrs. Richmond, an institution for babies, but one where they may be fed with milk peptonised fresh every time it is given?' The world is indebted to the scientific chemist, Fairchild, for a perfect means of rendering cow's milk, like mother's milk, digestible for infants; and well may the organ of the British Medical Association say of his Peptonising Powder—

'*Its introduction has probably done more than any other therapeutic measure of recent times to lessen infant mortality.*"—*Family*

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Health, Crop and Weather Report

[FOR THE WEEK ENDING 7TH JULY 1887]

Madras.—General prospects good.

Bombay.—More or less rain in all districts, except three. *Karif* sowing still going on in several districts, but retarded in parts of some districts for want of sufficient rain. River in Sind continues low and there is no improvement in the prospects of *kharif* cultivation. Fever in parts of seven, small-pox in parts of five, and cholera and cattle-disease in parts of twelve districts.

Bengal.—Rainfall has been general, but very irregularly distributed during the week. In Calcutta the sky has been overcast with frequent light showers, since last night. General agricultural prospects are favourable, but in the Burdwan and Chota Nagpore divisions some damage is reported from excessive rain. *Bhadui* and *aman* sowings are going on, and in some districts *aman* seedlings are being planted out. Indigo manufacture has begun in Behar. Cholera is still prevalent in parts of the Patna division, but elsewhere public health is good.

N.-W. P. and Oudh.—Rainfall has been general in the provinces and rather heavy in some districts. *Kharif* operations in progress in most places. Indigo and cane doing well. Cotton sowings begun. Supplies ample, but prices are still rising. Cholera continues to be reported. Cattle-disease decreasing.

Punjab.—Rain has fallen in Hissar, Delhi, Umballa, Jullundar, Lahore, and Rawalpindi, and is much wanted in Multan, Shahpore and Peshawar. Health is good, but some cases of cholera in Delhi, Umballa, Lahore and Peshawar. Prices are stationary in Hissar, Umballa, Amritsar, Multan and Rawulpindi, and almost stationary in Dehra Ismail Khan ; rising in Delhi, Ferozepore, Shahpore, and Peshawar ; and tending to rise in Jullundur and Lahore. *Kharif* ploughings commenced in Delhi and on well lands in Dehra Ismail Khan, and in progress in Jullundur and Lahore. Sowings commenced in Umballa and Rawulpindi, in progress in Peshawar, and somewhat retarded in Multan in want of water. Fodder scarce in Shahpore.

Central Provinces.—Favourable rain everywhere except in Raipore and Bilaspore, where there is some deficiency. Sowings continue. Cholera in northern districts. Prices steady.

Burmah.—Sporadic cholera and slight cattle-desease in parts of Lower Burmah. Ploughing and sowing progressing. Reports received only from two Upper Burmah districts.

Assam.—Weather rainy. Transplanting of *sali* commenced. Sugarcane and tea doing well. State and prospects of the crops good. Reaping of *dumai*, *ahu*, and *murali* crops continue. Public health fair. Cattle disease in Satidarang Prices steady.

Mysore and Coorg.—Rain more or less throughout the State. Standing crops in good condition. More rain needed in parts of the Bangalore and Tumkur districts for agricultural operations. Prospects of season favorable. Public health generally good. Fever prevalent in parts. No material change in prices.

Berar and Hyderabad.—Weather cloudy and rainy. Cotton and *tur* sowings completed. *Kharif* sowing operations in progress. Fever and cholera prevail in places. Cattle suffer from hoof-disease. Prices steady.

Central.
Rain general, but much wanted in Neemuch and Nowgong. Health good. Prospects good. Prices rising.

Rajpootana.—Rain has been general, and the weather is seasonable. *Kharif* operations are in active progress. Sowings of maize and *jowari* have begun. Cholera prevalent in Ajmere and Ulwar and fever and small-pox in a few other districts. Prices generally steady.

Nepal.—Weather fair. Transplanting of rice nearly completed.

Letters to the Editor.

PUMICE.

TO THE EDITOR.

SIR,—As your paper is the only present record of agriculture mineralogy and statistics, I venture to ask the following questions through the medium of your journal, and hope either yourself or one of your experienced correspondents will kindly enlighten me on the following points :—

Where can a large quality of pumice be found ? (2). For purposes is pumice required ? (3). Why is the Aden pumice noted for its hydraulic qualities ? (4). What are the essential constituents of every good hydraulic mortar ? (5). How are the pumice beds in Aden worked ?

K. GOSSAIN.

Serampore, July 10, 1887.

TREES FOR STREET AVENUES.

TO THE EDITOR.

SIR,—We are much indebted to your correspondent Mr. Cripps for his letter on the subject of street avenues. A pit at least three feet deep and three feet in diameter should be dug, and filled burnt clay, leaf mould, or some other compost, for the soil of tree, if it is wished to give it a good start. Nor should pruning done by native *malees*, who so hack the trees, as often check their growth for good. Mr. Cripps is, however, taken in supposing the wood of *Acacia* to be soft, and the *Mangifera Indica* (mango), and of *Terminalia catappa*, (country almond) hard. *Mimusops elengi* (Bokool) is doubtless a very durable and ornamental tree, but it's growth is too slow. Again "Peep" is a misleading word, and might mean, unless qualified "Aswath," *Chavica Roxburghii*, a creeping plant, whose flower spikes yield long pepper. In addition to *Azadirachta Indica* (neem), which your correspondent justly thinks to be one of fittest trees for cultivation along the borders of roads, the following would form a good street avenue—*Saraca Indica* (*Syzygium jambolanum* (Kala-jam), *Artocarpus integrifolius* (Ja *Calophyllum inophyllum* (sultani-champa), the Mangosteen *Nephelium longan* (ash-phul), and *Bauhinia purpurea* (Rakanchan). For the *maidan* and wide streets, I would recommend Mahogany, *Quercus* (oak), *Rhizophora mucronata* (Bhora), *Tectona grandis* (The teak), *Terminalia chebula* (Horitoki), *Terminalia tomentosa* (Pynsa), *Grevillea robusta*, *Lagerstrœmia parviflora* (Sida), &c. We have planted here a species of tree called "rain tree," which becomes very large and umbrageous in 4 years and serves as fodder. It might with advantage be planted on sides of roads, streets, and lanes which are protected from the of storms by rows of large houses.

RUS IN SUBURBE.

NOTE.—We hardly think the Oak would thrive in Lower Bengal.—*I. A.*

Editorial Notes.

An attempt is to be made to cultivate the Malta lemon in the Madras Presidency. Soil containing lime should be used for this tree. Old mortar or lime rubbish will be found very useful.

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The cultivation of the edible cactus in Southern India is being pushed forward with energy. A large number of plants has been offered by the Madras Agricultural Society for distribution among district officers, thirteen of whom have been applied with plants for experimental cultivation, the result of which will be laid before the Government next year.

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We have received a very nicely got-up catalogue of plants at the "Empress" nursery, Narcooldanga. *It is illustrated profusely for an Indian catalogue, although the illustrations* appear to have been taken bodily from W. Bull's price-list of plants, which has been taken as a model. However, emulation in horticulture is to be encouraged in this country, and we hope Baboo J. C. Biswas will have a successful season. His list is extensive enough to satisfy the most fastidious florist.

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We note that the Shikarpore Horse Show is advertised to take place shortly. The show last year was a great success, but unfortunately officers of regiments in Sind were prevented from attending, and no remounts were purchased, although there were many excellent ones exhibited. We hope the suggestion of the Bombay Government, that "the Director General of Remounts should be invited to arrange, if possible, for the show to be visited this year by officers to purchase horses," will be taken advantage of.

Tonquin, we learn, is threatened with a scarcity this year. Last year's crop was, it appears, two-thirds below the average, owing to the large quantity of rice destroyed by the floods, so that hardly any stocks remained in the country. This year the weather hitherto has been fairly favourable, but the area cultivated is only [illegible]n-tenths of that planted with rice in 1886. This is said to be due to a large number of the people having taken to work as coolies and labourers, instead of, as in previous years, cultivating the land. The prices of rice have already risen so high that some distress is being felt among the poorer classes.

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The Government of Madagascar, apparently, have an eye to business, for we learn that the Prime Minister is carrying out an experiment in the cultivation of tea in that country in a garden of his own, situate about two miles from Antananarivo. The garden consists at present of about 200 plants, raised from seed obtained from the Botanical Gardens in Mauritius. The plants seem to have flourished, as, though the seed was put down less than twelve months ago, most of them are upwards of eighteen inches in height. Both the climate and soil in many parts of the island are favourable for tea, and as labour is cheap, tea-growing may turn out a profitable investment.

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We reproduce elsewhere a rather important correspondence that has taken place between the President of the Bengal Chamber of Commerce, and Mr. J. E. O'Conor, Assistant Secretary to Government in the Department of Finance and Commerce. The question at issue relates to the prices of agricultural produce in the North-Western Provinces and Oudh. So far as we can see, Mr. O'Conor has got the better of the argument, although he appears to us to have displayed unnecessary warmth in refuting Mr. Steel's statements, which the latter has very naturally resented. But the correspondence illustrates how our statistics can be turned and twisted to suit individual tastes.

At the two last public sales of tea in this city, a good business was done. On the 30th ultimo, 7,543 chests were offered, of which 7,282 chests were sold. Again, on the 7th instant, [illegible]69 chests were offered, and about 5,300 chests found buyers. Throughout the fortnight the demand for strong and flavory teas has been maintained, and some invoices of high quality, bearing well-known marks, have met with keen competition. On the other hand, any lots without special point have been neglected, and Pekoes and Broken Pekoes of this class show a considerable fall from values previously ruling. Pekoe Souchong kinds and Broken teas remain fairly steady.

We publish in another column Messrs. W. J. and H. Thompson's annual review of the London Tea market, from which it will be seen that India has at last left China behind in the race for the London market at least. The Messrs. Thompson calculate the total home consumption for the next twelve months at 187 million lbs., of which India and Ceylon are estimated to contribute no less than 100 million lbs., or say, 53 per cent. of the whole, so that at last China must take second place. They express themselves hopefully as to the further development in the demand which the present prices of Indian teas are likely to produce, and it is satisfactory to learn that they look for this increase being obtained at prices which will leave a fair profit to the producers.

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In reply to a correspondent who wished to know how anthrax attacks cattle, the Veterinary Editor of one of our exchanges said :—"Anthrax affects cattle chiefly in three ways —(1) As rapidly forming swellings on the tongue, which is held out, is livid, congested, and painful ; (2) as swellings along the back, loins or other parts, where areolar textures abound, familiarly known as black-leg or black-quarter; and (3) as splenic-apoplexy, or splenic fever, a suddenly occurring, rapidly fatal complaint, characterised by enormous engorgement of the spleen. Anthrax, in whatsoever form, depends upon the presence in the blood, and in the swollen parts, of mico-organisms, consisting of a fungus plant or bacillus, the spores of which are generally introduced into the bodies of cattle in their food or water, and in susceptible subjects multiply rapidly, and speedily induce congestion, acute fever, and usually death."

Indigo advices up to the 9th instant from Tirhoot and Chumparun are not very satisfactory. The weather has been very unsettled, and we hear of complaints of too much rain from all quarters. The *Mahai* reports are very indifferent, and produce poor. From Chuprah, accounts are a little more satisfactory ; the few manufacturing returns received show a better result than in either of the above districts. From Lower Bengal accounts are very conflicting. In Bhaugulpore and Purneah the rainfall has been very heavy, and owing to the rapid rise of the rivers, some factories have sustained serious damage, and from all accounts, we fear these districts will not do as well as was at first expected. From Moorshedabad, Jessore, Kishnaghur, Rajshahye, and Midnapore, manufacturing reports are unsatisfactory, and produce generally is reported poor. In Benares and the North-West, good rain has fallen and prospects have improved.

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A consular report on the commercial condition of Foochow, contains a review by a resident British merchant, of the Chinese tea season of 1886-87, from which we gather that the celestials have awakened to a proper sense of their position in the tea market. It appears that the season of 1885-86 was an exceptionally favourable one, and money was sent up-country in abundance for the purchase of the new crop, and the keenness of competition which was thus brought about, caused prices in tea districts to rise from 5 to 10 per cent. The final result was, however, somewhat disastrous, for, though the crop was a fair average one, it proved not to be liked at home except as regards the leaf from a few districts ; and, moreover, some of the teas had been picked too young, making the liquor very thin. The sales in London thus proved unprofitable, and [illegible] teas showed from 20 to 30 per cent. loss. One further feature of interest has been the great difficulty in selling in London the finest qualities, many of the crack chops being still unsold, entailing heavy loss to the importers. The demand has been for teas costing under 1s. per lb., the result of cheap Indian teas.

To make up for this, the wily Chinese tea-makers tried to over reach themselves by adulterating their produce, and sent a large quantity of an article known as "lie tea" to Foochow, which was, however, summarily seized and burnt by the authorities. But not to be misunderstood in the future, proclamations were issued far and wide, warning the people of the consequences of continuing to make counterfeit tea and placing the same on the market. Another point of some interest in the report is the great expansion that has taken place in the manufacture of brick tea from dust and broken leaf by Russian merchants in China. Some of these firms at Hankow and Foochow are now employing steam machinery, and are putting forth every endeavour to make the bricks smaller in size and more attractive in appearance. The trade in this article with Central Asia is said to be increasing most rapidly.

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IN another column will be found the forecast of the jute crop in Bengal up to the end of June, 1887. The approximate normal area is estimated at 1,260,400 acres, by far the greater portion of which is situated in the Dacca and Rajshahye divisions. Eleven districts are shown as having an increase of from 3 to 20 per cent, or an average of nearly 10 per cent, and four districts show a falling off in area from 13 to 23 per cent, or an average of about 12 per cent; while there are three districts having the 'normal' area. The decrease in area occurred in two unimportant districts of the Rajshahye and Burdwan divisions respectively. In the former it was due to want of seasonable rain at sowing time, and in the latter owing to a greater demand for early rice, which displaced jute. On the whole, a larger crop is expected this year. It is very satisfactory to note that "non-official" agency was utilised in obtaining reports. This is what we have been urging on the attention of the Bengal Agricultural Department since its formation.

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THE final report on the area and outturn of the oilseed crop in the Punjab for the *rabi* season 1886-87 shows as considerable a falling off as the wheat crop; but this was to be expected from the character of the season. In those districts that did not share the October rainfall, the area sown naturally contracted, while in those in which, owing to favourable rain, a large area was sown, a considerable portion failed by the scantiness of the winter and spring rains. These are the two causes which have mainly contributed to the decrease in area, but frosts in February also did much damage. The total area returned is 355,300 acres, against 510,908 acres last year, exhibiting a decrease of 30 per cent. In November the area was estimated at 511,100 acres, which was reduced in January to 414,200 acres, but even this was too high. The redeeming feature of the forecast is that the quality of the oilseeds is said to be very good, and that there is a considerable demand for export purposes. The total outturn is estimated at 839,100 cwts.

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WE are told that last year there was a considerable falling off in the the revenue derived from the lime quarries in the Khasi and Jaintia Hills. The reason given is that there was general depression in the trade at Chhatak, where the lime was sold at greatly reduced prices. The result was that in no less than six of the quarries which are worked under the permit system, there was a falling off of nearly a lakh of maunds in the quantity of stone quarried, which caused the decrease of upwards of Rs. 1,000 in the Government royalty. In the largest quarry of all, ...lla, there was no decrease, and the quantity of stone quarried was nearly the same as in the previous year, so that the fall in the price of lime did not affect the working of this quarry. The Deputy Commissioner has been called upon for an explanation of this anomaly, and also as to the probable reasons for the fall in the price of lime. The working of the permit system is also to be especially inquired into and reported.

A CORRESPONDENT of a local paper says: "I see that an attempt is being made in Calcutta to form a limited company to retail tea to the natives of India. The scheme should command success if judiciously carried out, but surely 12 annas per lb forbids success, and such a price, if introduced into China, would choke off the bulk of tea-drinkers there. Some crops average six annas to seven annas per lb. in the Calcutta market; and good drinking tea could be bought at from three annas to four annas, and the question arises, if the project on hand is to take root, why should not these cheap but good drinking teas be supplied at six annas to eight annas to the consumers?" This is exactly how the matter presented itself to us. We fear, however, that so long as the "Tea Ring" in Calcutta continues to work on its present system, no material change can take place in the Indian Tea market. The collapse of the wheat and other "rings," in Chicago is hailed with delight by most people; and if the several "rings" in this city do not look sharp, some such collapse may be looked forward to at no distant date. The effect of these "rings" is to paralyse trade, and the sooner they are destroyed the better for trade in general.

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ONE of the matters discussed at the Silk Conference held in this city last March, was the advisability of getting out an expert from France to investigate the causes that have brought about so much disease among the silk worms in Bengal, and to devise means for remedying the present condition of this important industry. We are now informed that arrangements are on foot to engage in France—with the assistance of Mon. Natalis Rondot, President of the Lyons Chamber of Commerce, and a high authority on sericulture in that country—the services of an expert whose engagement would be for one year to begin with. The Governments of Bengal and India, and the European commercial community interested in the silk industry in Bengal will, between them, defray the expenses of the expert, and it is estimated that the expenditure, which will include the erection of rearing sheds, purchase of seeds, &c., will amount to something like Rs. 20,000. It is intended to offer the expert a salary of Rs. 300 per mensem, for which a first-class man should be easily procured, as well as defray the cost of his passage from and to France. Mr. N. J. Mookerjee, the Bengal Cirencester graduate, who is at present in the silk districts, will continue his work in conjunction with the French expert.

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THE following is the official summary of the reports on the state of the season and prospects of the crops for the week ending 7th July 1887.—Except in the Punjab, there has been generally good rain throughout the country during the week under report. *Kharif* ploughings and sowings are now in progress everywhere. More rain is, however, wanted to facilitate operations in parts of Bombay, the Punjab, Rajpootana, and Central India. In Madras, Mysore and Coorg the standing crops are in good condition. The *aman* rice is being sown in Bengal, where in some districts seedlings are being transplanted. The *sail* rice is also being transplanted in Assam, where three varieties are being reaped. In Bombay and the Central Provinces rice sowings are doing well. Ploughing and sowing for the rice crop in Burmah are progressing. Sugarcane is doing well in Bengal, Assam, and the North-Western Provinces and Oudh. Cotton sowing has commenced in the North-Western Provinces and Oudh, and has been completed in Berar. Cholera is still very prevalent in Bombay, and is reported from most districts in the North-Western Provinces and Oudh. Elsewhere the public health is generally good. Cattle-disease exists chiefly in the Bombay presidency. Prices continue to rise in the North-Western Provinces and Oudh, and in four districts of the Punjab. Elsewhere they are fairly steady.

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THE *Times of India* notices that the London *Miller* has a note on Indian wheat which should be read with attention here. The writer, who seems to have been prompted from Bombay, says that from Bombay alone last year as much as £51,000 was paid on the transport and freight of dirt instead of wheat. This is a fact—if it is a fact—that stands out almost as strongly as the illustration we have used before now of one in every twenty wheat ships going home laden with dirt. According to this statement, the Bombay Chamber of Commerce propose to alter the contract forms so as to modify the 4 per cent refraction to

2 per cent. The advantages of such a course are, as we have often argued, obvious :—"In the first place, there is no doubt as to the bad effect which the habitually dirty condition of Indian wheat has exercised on its popularity in Europe; and in the second place, the amount of percentage of foreign bodies now shipped is so large as to cause an appreciable loss in the shape of fares and freights." Indian wheat can be cleaned down to as fine a point as any other wheat in the world, and but for a vicious custom that has arisen almost accidentally, it could be sent home almost free of all extraneous matter. But no reform is really feasible until the contract form is altered, and all the shippers are put on the same footing.

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THE progress report of Forest Administration in Coorg for 1885-86 records some experiments in pitting fodder in silos, which yielded better results than in the previous year. One of the silos, we are told, made last year in the Mercara fuel plantation was enlarged and made circular, 14½ feet in diameter by 8 feet deep, and roofed with thatch. It was filled with the common coarse grass growing on the hill-sides ; the filling lasted from the 14th October to the 30th. The pit was filled up to 3 feet above the ground, and about 3 feet of earth loaded on to it. It was opened on the 28th March, *i.e.*, five months after being closed. The silage turned out very good, and bullocks ate it freely. The weight of the silage was only 18 lbs. to the cubic foot, and as half-a-foot all round the pit was mouldy, only 36 cartloads were obtained which were sold at Rs. 1-4 a cart-load to cover the cost, which was Rs. 44. A cart load of 24 maunds (28 lbs. each) fed three pairs of bullocks for four days, or 12 pairs of bullocks for one day. To feed them on paddy straw in Mercara would take 144 bundles at Rs. 2 per hundred, say Rs. 2-15, so that the ensilage cost less than half the price of straw. Two silos that had been made in 1884 were also opened, and in spite of passing through the monsoon without a roof, a core of good silage was still found. Two silos were made—one in Gandadagundi plantation, at Fraserpet, and one in the *Herikere* sandal plantation, but the grass put in was too dry, and did not ferment properly. In fact it came out much in the same state as put in.

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WE have been requested to make the following corrections in the figures relating to the average rate per rupee in seers of wheat in the Punjab, as given in the last wheat forecast :—

	seers.		seers.
For Amritsar ...	19	*Read* Amritsar ...	19
Karachi ...	18	Karachi ...	13
London ...	108	London ...	1·08

We published the forecast in our issue of the 2nd instant, and drew attention to the extraordinary character of the figures, as they appeared to us to be quite incomprehensible. But the irrepressible "P.D." had been at work, it would appear, and the mistake was his handiwork. We are at the same time informed that the produce per acre was estimated in bushels of 63 lbs for the sake of comprison with the English bushel, the weight of which varies in almost every county in England. We are glad to be set right on these points. It would save much worry if those responsible for the preparation of statistics would favour the press with additional information on doubtful points, as in the present case. It is a courtesy for which we thank our correspondent.

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THE returns of railway-borne traffic in the Central Provinces for the quarter ending March 31st, 1887, show that, owing to deficient rainfall last year, the rice crop over a considerable area was a total failure, and in only a few places did it yield more than a half crop. The loss therefore was very great, especially when it is remembered that the area under rice in these provinces covers three millions acres, two-thirds of which are confined to the Raipur, Bilaspur, and Sambalpur districts. Notwithstanding this deficiency, both the import and export traffic in grain compares favourably with that in the corresponding quarter of last year, thus :—

	1887.	1886.
Imports	12,75,969	9,94,824
Exports	[illegible]	[illegible]

Of the above, the exports of rice amounted to 2,92,492 maunds, against 6,00,520 maunds in the corresponding quarter of the preceding year. A large quantity (nearly 1½ lakhs of maunds) of rice was imported from the N.-W. Provinces, and over one lakh maunds of *Juari* from Berar, which accounts for the increase in the import traffic. The increase in the export traffic was chiefly due to a large increase in wheat, which, although it compares favourably with the corresponding quarter of last year is far behind that of 1885, as will be seen from the following figures :—

	1887. Mds.	1886. Mds.	1885. Mds.
Cotton ...	98,648	71,298	22,022
Wheat ...	11,61,198	9,10,487	24,54,160
Rice ...	2,92,492	6,00,521	6,09,000
Linseed ...	4,03,317	3,54,718	6,41,026
Tilseed ...	4,35,333	3,03,748	1,28,041

The exports of cotton and tilseeds during the quarter under notice show an exceptionally large increase over the figures for the previous year.

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THE Director of Agriculture, Madras, mentions that "specimens of tobacco grown in the Godaveri district were sent to the Poosa factory in Tirhoot to ascertain whether cigars suitable for the European market could be made of it. The report on the results of the experiment is encouraging. The leaf examined, however, showed an excess of saltpetre in the soil where it was grown, but it burnt well, and with fairly good ash. The manager of the factory thought that the leaf sent to him was much better cured than any other Indian leaf he had seen, and was of opinion that, on the whole, the sample was of good quality ; and if grown with more vegetable, and less organic manure, and properly cured on the American system, the Godaveri tobacco would make a good leaf for the European market. Samples of the Trichinopoly tobacco were also sent, but no report has yet been received regarding them." We do not quite understand the meaning of "more vegetable and less organic manure." It has now been laid down that soils and manures containing a large proportion of potash are best suited for tobacco cultivation so far as the *flavour* and *smoking* qualities of the leaf are concerned ; but nitrogenous manures will certainly produce the best growth. It would be well to keep this fact in mind when growing tobacco for the manufacture of cigars for the European market. It seems a little odd, however, that the Madras Government should be sending tobacco leaf from that presidency for report by the Poosa people, when Messrs. Oakes & Co. are manufacturing their "Beehive" and other brands of cigars from leaf grown in Southern India by tens of thousands, and which find such a ready market in Bengal ! In fact, the larger proportion of European smokers in Calcutta and other large towns smoke nothing but Oakes's "Beehives" and "Supers," while the Poosa tobaccos and cigars are scarcely to be met with in the Calcutta markets. The cigars are certainly not patronised—at any rate we would not ourselves exchange one "Beehive" for 500 Poosa cigars. The demand for Messrs Oakes's cigars is so great in these parts, that the firm, we are told, find it difficult to keep up the supply ; and the result is that lately their cigars have fallen off very much in quality. This is much to be regretted, as the firm is at the present moment losing its ground, and the complaint is general that the 'Beehives' are falling off in quality.

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A CORRESPONDENT of the *Pioneer* makes a novel suggestion for developing the horse supply of India. He says : "I beg to suggest a plan which, though not horse breeding in India, would, in my opinion, be the next b[illegible]ng to it, inasmuch as the profits arising from [illegible] same would be circulated in India. I do not think I am wrong in supposing that a great many of your readers know as little about the geography and resources of Nothern Australia as the Australians know about India; therefore a little information on the subject may not be out of place here. A large portion of the north of Australia is in or about the same latitu[illegible] as C[illegible], and [illegible]ording to the readings of the thermo[illegible] since I ha[illegible] been [illegible] India, is equally as hot. It is good [illegible] country, and horses that are bred there, do equally as

well as they do in the Southern Colonies. But importing horses from the South is always attended by losses unless they are driven overland, when they gradually become acclimatised. They have two of the finest ports in Australia, *viz*, Cambridge Gulf in Western Australia, and Port Darwin in the Northern Territory, and they are only ten or eleven days' steam from Calcutta. The West Australian Government being anxious to encourage settlement on the north, grant leases of large tracts of country on mere nominal terms. The lessees are called squatters, and their leasehold is called a station. The population of the north is very small, each station being worked by one or two white men and a few black boys. Now what I would propose to do is to form a company in India to either purchase a station, or take up new country in the vicinity of Cambridge Gulf, or Port Darwin, and breed horses for India. The horses would be better suited to the climate; there would be less loss in shipping: and their transport would be accomplished in about half the time it at present takes from Melbourne. Horses could be purchased in Northern Queensland and driven overland to Port Darwin; and, when recruited, shipped to India; so that if there were a company formed, they need not wait until they had young stock of their own to make a profit out of their speculation. If, Sir, you consider this sufficiently interesting for publication, and if any of your readers should be desirous of forming a syndicate or company for the above purpose, I will be happy to give them any further information they may require on the subject."

FOREST ADMINISTRATION IN THE JEYPORE STATE.

This state in Rajpootana is well known for the enlightened character of its general administration; indeed, we believe it to be one of the foremost Native States in India. We are well acquainted with the town of Jeypore and the surrounding country, and always thought that one of its wants was forest conservancy. This has now, we are glad to see, been met by the appointment of a forest ranger, and the initiation of a system of forest work, which cannot fail to prove of the greatest benefit to the State in future years. So far back as 1885 it was decided to take steps for the promotion and management of forest conservancy, and in November of that year the services of Mr. E. M. Moir, deputy conservator of forests, N.-W. Provinces, and Bhai Sadhu Singh, forest ranger, were lent to the Durbar by the Government, on an application from the former. These two gentlemen went carefully over the country to be conserved, and submitted a report. Mr. Moir has now left, and the Forest Department is exclusively under the charge of Bhai Sadhu Singh, who has been lent to the State for a period of three years, and who works under the orders of the State Executive Engineer. The result of the labours of the forest ranger is embodied in an interesting report, now before us. It is a record of much hard work during the year, for the difficulties of initiating a new system into a country where the rights and privileges of a people have probably never been interfered with for a very long period, will be understood by comparison with the difficulties experienced by our own forest officers in British territory in this matter of forest conservancy. But it is satisfactory to note that the demarcation of areas has been carried out without any serious friction with the people, and has made good progress; for we are told that 13,381 acres were marked out during the half-year, of which 2,294 have come finally under the control of the Forest Department. All disputed areas were "referred for the consideration of the higher authorities," by which we suppose is meant the Raj Council, and the court specially constituted to deal with such questions. In the matter of forest reserves, it is proposed to take in an area of 214 square miles, or about 137,000 acres; of this, 12,750 acres are to be entirely closed against grazing of any kind whatsoever; 52,[illegible]6 acres against browsing of goats, sheep, and camels for the whole year, and other cattle for a few months of the year; while the remaining 72,[illegible] are to be protected against unnecessary damage. Eleven preserves have been marked out in the vicinity of Jeypore, out of the 18 sanctioned by

Some good work was done in the way of planting and raising seedlings in nurseries. Altogether 25 species of forest trees are mentioned as having been raised in the two nurseries, amounting in number to 22,432. The nursery at Aminasha ought to be a very thriving one, as it is in this vicinity that the water-works are situated. There is unfortunately nothing but shifting sand here, and it will be necessary to prepare a sub-soil if any really practical results are expected. The "Ram Newas" Gardens, the various Ghat gardens, the "Ram Bagh," on the road to Sanganeer, and Sanganeer itself, offer good situations for establishing nurseries in. A good supply of water is needful in Rajpootana for nurseries, and these places appear to be well situated in that respect. To the south of "Moti Doongree" good soil exists, with a large patch of water, and here also a nursery might be opened. "Nutney-ka-Bagh," where the Residency surgeon used to live, (and perhaps lives now), has plenty of ground well suited for a forest nursery. The garden once owned by one of the Prime Ministers (we forget the name), near the railway station, might also be utilized for the purpose. It is situated quite near to Lt.-Col. Jacob's residence, and would be well looked after. The great point to be kept in view just now is to raise a very large number of plants, which should be extensively planted out during the months of July, August, and September. The "punni" grass (*Saccharum sara*) is very well in its way; but if any thing is to be done from which practical results are to be obtained, something more than *grass-planting* will be necessary. There are large tracts of sandy waste land between the Ghat and the city, to the south-east, which require planting very badly. Some splendid undulating land, convertible into magnificent forest, is to be found east of the Ghat, where already there are some fine growths of "kikar" (*Acacia Arabica*). We mention these facts as the country is well known to us.

There is an important memorandum attached to the report by Dr. Stratton, the Resident at Jeypore, which contains some valuable hints, and another by the Inspector-General of Forests, N.-W. Provinces. The latter partakes more of a criticism of Mr. Moir's report than anything else. But the points noticed are of importance, and should be taken as a guide in future, especially as the remarks are by an experienced forest officer. Date culture also received attention at the hands of the forest department; but the subject will be noticed separately in our next.

The expenditure on forest operations during the year amounted to Rs. 10,310, and the revenue to Rs. 1,006, of which Rs 35 only were realised. But this is to be expected in the first year. It will be a long time before the revenue comes anything near the expenditure; but this need not alarm the Durbar, as there are some forest areas in British territory which are being worked annually at a positive loss. The report is accompanied by a map, which, for all practical purposes, explains the operations now undertaken; although the map might have been a little more in detail.

We note with some regret the tendency to encumber a really interesting report with useless appendices: they are *not* necessary for an elucidation of the report. The financial and other accounts can, with much more profit and saving of time, labour, space, and expense, be stated in a brief *resumé* in the body of the report. No one takes the trouble of wading through several pages of complicated forms and figures. These might with much advantage be kept as records in the forest office. We hope Lieutenant-Colonel Jacob will see the wisdom of our remarks, and restrict in future this practice of encumbering an interesting report with useless appendices.

Liquid Grafting Wax.—The so-called "French Mastic," so long known as "Lefort's Liquid Grafting Wax," is made by melting one pound of common rosin over a gentle fire, and stirring in one ounce of beef tallow. Take from the fire, and when it has partially cooled, mix in eight ounces of alcohol. If this cools it off too rapidly, it must again be placed over the fire, but great caution must be used to keep the alcohol from taking fire. When well incorporated and cool, put in tin cans, or glass bottles, and keep well covered or corked. This was, until quite recently, kept a secret, and the "mastic" imported from France.—*American Agriculturist.*

THE BENGAL JUTE CROP.

FORECAST TO END OF JUNE 1887.

THE Director of the Bengal Agricultural Department has courteously placed at our disposal the following forecast of the jute crop in Bengal to the end of June 1887 :—

In the forecast of the jute crop for 1886, published on 15th August last, it was said that more than a full average crop might be expected. The trade statistics of the year have shown that the importation of raw jute to Calcutta from all sources was practically the same as in the previous year, while the value of the exports from Chittagong was twenty-seven lakhs more than that of the previous year. It thus appears that the crop was a larger one than that of the previous year. Owing, however, to the lowness of exchange, and to a brisker demand in Europe, prices were on an average 15·4 per cent higher than in the preceding year. For this reason a larger area than usual has been sown this season, save in limited tracts which had suffered from floods in the two previous years. The prospects of the crop were generally excellent to the end of May, when the young plants were seriously damaged by floods which accompanied the cyclone, especially in the districts of Rungpore, Rajshahye, Dinagepore, Bogra, Julpigoree, and parts of Hooghly. These, however, excepting Rungpore, are not of first rate importance as jute-growing districts.

On the whole, so far as can be judged at present, it may be said that the area sown this year is about 10 per cent above that of last year, and taking into consideration the facts that the area sown is above the normal, and that the deficient outturn caused by floods in some districts will be counterbalanced by the bumper yield in others, it may be expected that the total outturn will be a full average. Much will, however, depend on the distribution of rainfall in the latter half of July and beginning of August.

The annexed statement* shows the estimated area under jute in each district, the percentage by which the area sown this year is supposed to exceed or fall short of that sown last year, and the estimated outturn expressed in fractions of a rupee. This statement has been compiled from reports received from 104 non-official reporters, and from returns based upon these reports, prepared by Collectors of districts ; but though the information given is the best available, and is believed to be fairly trustworthy, yet it is to be always remembered that no pretence to statistical [illegible]n be made for these estimates.

* [illegible] unable to p int th's, but it has been summarised in another column.—ED., *I A.*

THE KOLA NUT.

AT a recent meeting of the Society of Arts, Sir Augustus Adderley read an interesting paper on the West Indies, at the Colonial Exhibition, in the course of which he gave the following interesting particulars regarding the kola nut :—

The nut of the *Cola acuminata* (also called *Sterculia acuminai*, Gouron, Ombéné, Nangoué, Kokkorokou, Female Kola, Bissy-Bissy, and Coorooah), is destined to play an important part, both in commerce and medicine. In an exhaustive paper by Professors Heckel and Schlagdenhauffen, the eminent French chemists, kola is ranked equal to tea, coffee, maté, and cocoa. They found the nut to contain over 2 per cent of caffeine, as much, and, in good parcels, rather more than is contained in coffee, besides about 36 per cent of sugar and starch and other important constituents which determine the use of the nut as a food and medicine.

The properties claimed for the nut are—for checking dysentery and diarrhœa, more especially when contracted in the tropics, many cases of Cochin-China diarrhœa having been entirely cured ; for restoring impaired digestion ; for nervous debility arising from the group of symptoms known professionally as neurasthenia, which consists of chronic excruciating headaches, loss of appetite, costiveness, exhaustion, &c.; for restoring the system when under influence of alcohol, and to prevent a return to the habit of drinking. The latter property is claimed for it in "New Commercial Plants and Drugs," where it is related that a Jamaica planter treated the negroes with the fresh nut when in a state of drunkenness ; the good effect probably due to the caffeine in the nut combined with the tonic action of the other constituents upon the nervous system ; the statement that after the use of the kola nut the patient does not return to drink, is, no doubt, explained by its stimulating property, [illegible]ing so healthy an action upon the system that the want or craving for spirit is not felt.

The nut is ground and mixed with coffee, much to the gain of the latter in so far as stimulating effects are concerned, and for this purpose the price at which the nuts are obtainable make a very advantageous pecuniary difference to the dealer. When the nut contains over 2 per cent of caffeine, and can be had at 5*d*. or 6*d*. per lb., it pays to extract caffeine from them instead of from coffee. They form, also, the basis of a patented aërated drink and beer. Ground and made into a paste, the kola nut is now coming to the front as beverage. The nut has the singular property of clarifying beer and spirits, and rendering the foulest water healthful ; this action is due to the gum it contains. The tree, which stands from thirty to sixty feet high, resembling in general aspect the chestnut, frequents the moist hot woods of Western Africa, and has been successfully introduced into the East and West Indies, Seychelles, Ceylon, Mauritius, Zanzibar, Guadaloupe, Cayenne, Cochin China, and the Gaboon. It likes low moist lands, at the level of the sea, or a little above, but in does not do well above 800 to 900 feet. It yields its first crop at the age of five years, and is in full bearing at ten years ; a single tree then yields an average of 120 lbs. of seeds annually, the flowering being continuous after maturity. There are two crops—in October or November, and in May or June. The seeds are gathered when the dehiscence of the capsule takes place. They should be carefully freed from the husk and episperm (all damaged and worm eaten ones being removed), and if it is desired to ship them in a fresh state, it should be done in baskets lined with some large thick leaves. Fresh nuts are generally sold at the rate of 40*s*. to 50*s*. per cwt., but the market for fresh seed is very limited.

To dry the seed, so as to lose little weight and properties as possible, they should be placed in layers on trays in the shade, where there is plenty of air, and left till perfectly brown and dry. So treated, they will have a fine appearance, being neither blackened nor shrivelled, which is the case when allowed to dry in the sun, when they lose much in weight by a too rapid exhaustion of the moisture.

For many purposes, slow drying is not absolutely necessary, for instance in cases where the nuts are consumed in a powdered state ; but every care must be taken to prevent their becoming mouldy or worm-eaten ; a parcel of nuts with the faintest odour of mustiness would be discarded by manufacturers. The prices vary a good deal according to supplies and quality. A nut with a good appearance may fetch as much as 70*s*. to 90*s*. per cwt., whereas small shrivelled-up nuts have sold for 20*s*. to 35*s*.

This tree is certainly worthy of a more extensive cultivation, and would yield a handsome return to those having low-lying lands unfit for other products. The demand would greatly increase if manufacturers were assured of a continuous supply, enabling them to introduce permanent articles, which they are now precluded from doing for want of reliance upon the present shippers. A very useful little pamphlet on the medicinal and other drugs has been published by Mr. E. M. Holmes, curator of the museum of the Pharmaceutical Society.

In the discussion that followed the reading of the above paper, Mr. D. Morris, the Assistant Director of the Kew Gardens, said he did not quite know what the reader of the paper meant by saying that coffee should be sent home in the parchment. Coffee was never exported in this state, and, if it were, he believed it would not find a market. With regard to kola nuts, his opinion was that there was no real commercial demand for them in this country at present. The only people who consumed these nuts to any extent were those on the West coast of Africa. He had heard that a kind of chocolate or cocoa had been prepared from kola nuts, but he believed this was only an experiment. He considered that if the nuts were grown in the West Indies, it would be at a loss, owing to there being no market for them. The reader of the paper said that each pod contained fifteen seeds ; but if so, this must be a new variety, for he had never seen one containing more than three to six seeds, which of course are different from the "nuts" composed of the divided cotyledons. Of these there might be any number up to thirty.

Mr. Lascelles Scott said that with regard to kola nuts, he believed that when their composition was known there would be a great demand for them. A friend of his had just received an order for 20 tons of these nuts, and a further supply had been asked for, so that it could not be said there was no market for them. The manufacture of kola paste and chocolate was continually increasing, and it had been favourably reported upon by the engineers who were laying some railway lines in the Soudan. Mr. Morris, however, was not satisfied that there was any demand for kola nuts and put himself in communication with a large firm of druggists to support his argument. He then addressed

lowing letter to Mr. H. T. Woods, enclosing the reply from the druggists :—

In the discussion which followed the reading of Sir Augustus Adderley's paper on the "West Indies at the Colonial and Indian Exhibition," the question was raised whether there is at present such a demand for kola nuts as to justify its being recommended to be grown by small growers in the West Indies. I made a statement on the subject which was contradicted by Mr. Lascelles Scott. In order to obtain an authoritative statement on the subject, Messrs. Borgoyne, Burbidges, Cyriax, and Farries—possibly the largest wholesale druggists and manufacturers of pharmaceutical preparations—were asked the present price of kola, and whether there was any demand for it. Their reply I enclose herewith. As the object of the Society of Arts is to place an industrial and technical subject before the public in all its bearings, I hope you will be able to find room for this letter as an appendix to the discussion on Sir Augustus Adderley's paper.

Replying to your esteemed favour of the 18th instant, in *re* kola nuts, we beg to say that there is but little demand here for these nuts. Occasionally small parcels are disposed of at from 3*d.* to 4*d.* per lb., but if a large parcel were put on the market we doubt if they would find a ready sale, and possibly would not fetch more than 2*d.* per lb.

BURGOYNE, BURBIDGES, CYRIAX, and FARRIES.
per H. ARNOLD.

We drew attention to the importance of the kola nut some time ago, and noticed the fact that Messrs. Epps and Co. were manufacturing a compound preparation of kola nut and cocoa, which was likely to have an extensive demand. The peculiar valuable medicinal and other properties of the kola nut are clearly brought out in the following letter addressed by Mr. Thomas Christy to one of the London papers :—

Sir Augustus Adderley very much understated the following items of information, *viz.*, the value of kola nuts, and the preparation of coffee in London ; and Mr. D. Morris, the Assistant-Director of the Government Gardens, Kew, made matters worse by getting a letter from a well-known firm of druggists to support his criticism on the paper. Mr. Lascelles-Scott tried to set Mr. Morris right at the meeting, as he was working at this important article, and knew the facts of the case. In regard to the letter signed by Mr. H. Arnold (on behalf of Messrs. Burgoyne and Co.), he wrote to the best of his knowledge in regard to the fortnightly auction sales ; but the fact is that kola nuts come to Liverpool, and are sold there ; and when they come to London the brokers offer them direct to us, as they know we are the buyers. Besides these, quantities come to us and other consumers direct from the West Coast, and therefore do not appear on the market reports. This explanation is only due to Sir Augustus Adderley, who had evidently taken much pains to master the facts he placed before the Society. The demand for sound kola is beyond the supplies, and lately 1*s.* has been paid here for sound nuts for the whole parcel received. We have orders, which we are trying to execute, for 30 tons, and 100 tons would be taken if we could only get supplies of sound nuts, dried in the shade, at 5*d.* or 6*d.* per lb.

Kola chocolate is selling at 4*s*, per lb., and since it has been of so much service in the hospitals, its regular use is insured. We suffer in this country owing to the Government having no one to advise on such a food as this for the troops, and if I could have been present at the meeting, I should have said much more than you can afford me space for. Three of the Governments of Europe have ordered the preparation of the kola paste in quantity for army food. The experiments show that men can subsist on one ounce of kola for twenty-four hours, without the gnawing feeling of hunger and thirst, and when they can get food, they do not suffer from any inconvenience. This is thought to be due to the caffeine combined with the other constituents of the nuts, when mixed with a vegetable fat.

Wherever coffee has been found indigenous, it has been observed that the natives pick it and dry it in the cherry, or outer skin, and it is well known that this improves the quality, and the flavour is better retained, even for years. In many places merchants can command supplies of coffee in the form of "dry cherry," or in the "parchment," and some parcels, in the cherry, I sold to houses who roasted it with the outside jacket on; but as this required experienced roasting, the [illegible]ieters of the coffee warehouses saw the necessity and ordered the most approved coffee-dressing machinery, and erected them in London, and large quantities of coffee are treated here which command the full market price. During the last two months I have been seeking for some means of turning the large stock of coffee husks to some account, with the professional assistance of Mr. R. H. Harland, F. C. S., and of Messrs. Cross and Bevan; coffee dressers can find no use for these husks. The great advantage of this established enterprise is that the large companies opening up Africa can purchase the dry coffee in small quantities, and have it home in bags, and as soon as it arrives, it can be sent at once to the warehouses to be decorticated and placed on the market. Messrs. Major and Field, of Red Lion Wharf, allow us to state that in 1886 they decorticated 10,000 bags of coffee, and that in one vessel they received over 3,000 bags of coffee in the parchment to be decorticated. They further state that they have 100 tons of the husk which they would be glad to find a use for at a very low price.

In conclusion I would like to put on record another fact, *viz.*, that kola is being mixed with some of the preparations of coffee, which enables the vendors to state that their mixture contains "no chicory" which is of great importance now that it is proved that the addition of chicory conduces to the growth of hæmorrhoids.

ANNUAL TEA REVIEW.

MESSRS. W. J. AND H. THOMPSON, in their annual review of the India Tea Trade, say :—

The events which have marked the course of the season now concluded, will make it a memorable one in the history of the industry. The features which attract attention are—(1), the great increase in production ; (2), the still larger increase in consumption; (3) a range of price for much of the crop unprecedentedly low: (4), the ability which producers have shown to cope with conditions which at first sight seemed most discouraging.

In many respects the features of 1894 5 have been reproduced. In that season there was a large supply of low grade tea ; cheap prices for these leading to a great advance in consumption, while fine teas maintained high values. This was followed by the fine crop of 1885 ; higher prices for the low grades ; a marked reduction in the value of fine ; and an apparent check to consumption. The narrow range between the price of fine and common which marked that year, undoubtedly led a number of producers to aim at large rather than fine crops, which resulted in the total production of 1886, exceeding by four or five million lbs, the estimate of the Calcutta authorities In view of such a policy being adopted, we wrote a year ago, with reference to the comparatively low rates which had been ruling for fine tea, "to what extent conditions so unfavourable to high prices may be modified in the future, it is difficult to foresee—but in any case, we cannot recommend producers to pursue any policy but that of making the finest quality possible, consistent with a fair yield ;" the result has justified the opinion then expressed.

References to the past, however, are only useful to the extent of the guidance which they afford to the future, and from all we hear, the effect of the past season's experience will be to check the tendency to make a large yield irrespective of quality: the result will be a finer crop, showing little more than the natural increase due to higher cultivation, or derivable from fresh acreage bearing ; which view is consistent with the Calcutta estimate of 82 million lbs. as probable total of this year's supply. Assuming this to be the case, the values of fine and common may again come nearer together ; and the increasing supplies from Ceylon will operate in this direction, as the policy mainly pursued in the Island—wisely, as we think—is to make tea of such quality that it is valued by the trade above the level of common, and up to that of medium and fine Indian, although no tea has yet been produced which has the special characteristics of the finest Assam and Darjeeling Tea. We doubt whether the increased quantity of fine tea which we shall probably receive will have so marked an effect upon prices as would have been the case a few years ago ; as the reported inferiority of the new China crop will lessen the supply of tea over 1*s* per lb. and enable the trade to absorb a large quantity of Indian and Ceylon. Consumers also are becoming more alive to the merits of "good" as opposed to "cheap" tea—whether China or Indian—and their appreciation of the superior value from an economical point of view of Indian—to which Mr. Goschen alluded in his Budget speech—largely accounts for its increased consumption.

Another year's operations being entered upon, a close analysis of the past crop is unnecessary, the judgment of the trade having been shown ere this by the prices paid. Assam gardens generally speaking, have maintained their reputation ; but other districts, specially Cachar, Sylhet, and Dooars, have not been as

successful, and the very unsatisfactory prices which have ruled for most of their tea, is attributable to the large proportion made of tea not actually of common quality, but wanting distinctive character in cup, and low grade in leaf. The large consumption may be attributed not only to the increased supply of tea selling at very cheap prices, but to the fact that this tea, comparatively inferior as it was to the finer crop of 1885, was sufficiently superior in cup to the China teas, obtainable at the same quotations to displace them. Whether this turning of the scale in favour of Indian would have occurred if prices for China had been materially lowered earlier in the season, is an open question; and it is necessary to consider what may be the effect upon inferior kinds of Indian, should China send us during the coming season heavy supplies laid down at a low cost, as some anticipate.

Taking the general average of the tea of the present day, and comparing it as well as memory permits with the crops of ten years ago, a marked and general change in character is noticeable in the direction of lighter fermentation combined with more flavour and aroma, and this we take to be due to the fact that the machinery now in use is best fitted for producing tea of this type, and also that the rapidity with which all the operations of manufacture are now of necessity carried out, is not favourable to the processes by which the ripe and mellow teas of past times were produced. The present type is undoubtedly popular, but it has one attendant disadvantage: *viz.* that tea has less keeping quality. As tea is grown not to keep but to sell, it may be thought that this is immaterial, but it is not so to buyers; and the fear of loss through depreciation partly accounts for the "hand to mouth" system of buying, and fully explains the unwillingness of all but the boldest dealers to operate with confidence, and so lend support to weak markets, when perhaps they all agree that prices are unduly depressed.

One of the difficulties of the future which must be faced and thought out, is the problem of how to decrease the number of breaks. The difficulty is augmented by the growth of Ceylon, and the large number of samples which so many small and separate estates send to swell the total. Some dealers have different tasters for Ceylon and Indian, but it is doubtful if this will be found practicable when the two sorts come more closely into competition, and are eventually regarded as much parts of a whole as the pro- the different districts of India now are. It has been suggested to lessen the number of samples by making "unassorted" tea, but we feel this would be most unwise to attempt upon any large scale, for it would overstock the market with tea of a uniform grade, which would probably fall to the level of Souchong or common Pekoe. The wide variety in the type, make, and grade of Indian tea has from the beginning, been of the highest value in assisting its progress; and the same feature of variety is now helping Ceylon to push its way. There is nothing which dealers seek for and appreciate more keenly than "individuality" in tea, and this is generally the secret of the prices paid for certain marks—which it would be invidious to specify—month after month, however flat or irregular the general market may be. To no description does this apply so much as to Darjeeling, for in no other growth is there such a wide difference between the value of special flavour or quality and the value of plain or pointless tea. The solution which at present seems most practicable, is to raise the size of breaks by putting together parcels of similar grade and value, either at the factory or in London. This may involve some expense in providing accommodation where it is inadequate, or in building charges, but such may prove a lesser disadvantage than the risk of tea passing the auction without being properly valued by the trade.

The objection which might once have been raised that only a few buyers could take large breaks, and that small buyers would be debarred from bidding, has not the same force now that prices are so much lower and quotations for many kinds adjusted to fractions of a penny: while, as a matter of fact, for twenty years and more, the buyers have been used to deal in China tea in lines ranging from 100 to 1,000 packages. We recommend factory bulking, if it can be done so well as to preclude the disputes which arise when variations which cannot always be detected on inspection, are afterwards found: experience shows that many buyers give a decided preference to it, and in the case of fine descriptions the advantage of being able, through good factory bulking, to sell without turning the tea out is often represented by pence per lb.

These, however, are matters of detail, which must be worked out by managers as varying circumstances permit: the readiness shown to act upon suggestions from this side, and to study the wants of the trade, encourages the hope that difficulties will be met and surmounted as they arise.

It is of more importance to consider how to enlarge the area of consumption without further reducing prices. We look with hope to a development of the export trade both to the Continent and to the States, but specially to Canada, where we learn there is a growing demand for black tea in place of the Japan and China green, now mainly used, and we think that the prices now reached will open to Indian tea the door which real merit has not been able to force. A considerable quantity between 8d. and 1s. has this season been exported—tea with small even leaf, and flavoury or plain liquor; broken leaf, or finer teas at a higher price being declined; and if such can be sold at prices which make them cheaper than China Congou or Java tea—as during the past season—the business should grow. The total Home consumption during the next 12 months should be about 187 million lbs, allowing for the average annual increase of the past six years. Towards this India and Ceylon will probably contribute a supply of 100 million lbs., equal to 53 per cent of the required quantity: the proportion now reached is about 50 per cent, so a further increase is necessary and a monthly delivery of 7 million lbs. of Indian and 1¼ million lbs. of Ceylon is required to keep the statistical position sound. Is this possible? We think so, and at prices which will leave a fair profit to producers; but it is evident that while economy is not forgotten, no pains must be spared to keep quality up to the point which will ensure Indian Tea maintaining its popularity with consumers.

The following are the statistics for the past three seasons, dating from 1st June to 31st May:—

Total Import:—

	1886 87.	1885-86.	1884-85.
Indian	78,200,000	67,210,000	61,472,000
Ceylon	8,060,000	5,060,000	2,482,000
China	138,900,000	143,050,000	139,220,000
Java	3,494,000	3,849,000	3,256,000

Total delivery, Home consumption, and Export—

	1886 87.	1885-86.	1884-85. *
Indian	75,425,000	60,735,000	69,109,000
Ceylon	7,744,000	3,933,000	2,047,000
China	134,300,000	139,610,000	†157,370,000
Java	3,671,000	3,585,000	3,545,000

Stock 1st June—

	1886 87.	1885-86.	1884-85.
Indian	23,517,000	20,747,000	13,548,000
Ceylon	2,184,000	1,865,000	738,000
China	43,100,000	39,893,000	35,320,000
Java	1,054,000	1,231,000	959,000

* Raised above the average by heavy clearances in March—April 1885, when an increased duty was expected.

† Lowered below the average by heavy clearances in March—April 1885, when an increased duty was expected.

Miscellaneous Items.

HONEY DEW.—The peculiar, viscid sweetish substance that sometimes appears on the leaves of pears and some other trees in summer, and which is known as "honey dew," is largely, if not entirely a secretion of the aphis. Ants are fond of this secretion, and hence are always found on plants infested with plant lice. Indeed, the latter are treated by the ants much as if they had been reduced to a state of domestication. It is known that the ants frequently transport the lice from place to plac that they know how to cause them to yield their sweet secreti at will; and they are also thought to protect them from their inse enemies. They are called "ants' cows."—*American Agricu turist.*

GERMINATION OF BABOOL SEEDS.—A correspondent writes to th *Indian Forester*: "I have had a good deal to do with babool fores and goats. The latter usually wandered about all day feedin and were herded at night. When we wanted babool seed simply collected excreta. Nearly every globule contained one more. I should say the seed passed through the animal wou be far better than that simply shelled out of the mouth. the same time it is by no means so necessary as is general supposed, that the seed and the animal should become acquainte Common dry seed will germinate perfectly well in a week two, if only it gets water. Softening the seed in plain wat before sowing is a good plan. That recommended by J. Sednem, is better."

A FAIRY OAK TREE.—To produce one of these dainty little p take an acorn and tie a string round it, so the blunt and

the cup was, is upwards. Suspend it in a bottle or hyacinth-glass, containing a small quantity of water, but be careful that the acorn does not reach within an inch of the water. Wrap the bottle in flannel and put it in a warm, dark place. In a month or less, the acorn will swell, burst its coat and throw out a tiny white point. This is the root, and when half an inch long the water may be allowed to rise higher, but must not touch it until the neck of the root begins to turn upward. As soon as this stem commences to shoot, the baby oak will require small doses of light every day, and the root can now extend into the water. In a week or so it will be ready to be moved to a window where you can watch the development. At first, the tiny trunk that is to be will resemble a whitish thread, covered with small scales. Then the scales will expand and the end become green. Little leaves will appear, veins will branch, and old scales fall off, until you have a perfect miniature of the great kings of the forest.—*American Agriculturist.*

A GIGANTIC SEMUL TREE.—A correspondent writes to the *Indian Forester*:—"At the very summit of a small hill situated almost in the centre of the Kuttumpollie teak plantations, at the foot of the Coorg ghats, with an elevation of 700 to 1,000 feet, average rainfall 190 inches, and about 24 miles in a bee-line from the sea, stands an enormous *Bombax malabaricum* (Simal, púla or cú'í mara), the dimensions of which might interest your readers, as I think it is a "record" tree for Southern India. Its height is 135 feet, girth at 3 feet from ground 102 feet, and at 30 feet from ground 15 feet; thus shewing the enormous size of its buttresses, which are seven in number, and would easily contain an elephant between any two of them. The situation is, for the locality, a decidedly dry one, and as I have said above, it crowns the summit of a hill about 300 feet higher than the surrounding country, with fairly steep sides, the angle of slope probably being about 30°, a shallow soil with a gravelly and free subsoil.

INSECT-KILLING Plants.—We do not refer to pyrethum, or to any other vegetable poison that may be used to destroy insects, but plants which, finding insects their most acceptable food, feed upon and thus destroy them. So many plants are destroyed in furnishing food to insects, that it would appear but a just compensation in the order of things that the insects should sometimes fall a prey to plants. The plants in question belong to the order of Fungi, to which the mushrooms, toadstools, etc., also belong. Nearly twenty years ago (June, 1869) we figured a caterpillar, the well-known "white grub," which is the larva of the beetle popularly known as May Beetle, and June-Bug. This had growing from each side of its head a curved projection, about its own length; these were of a dull, purplish color, and are the dead fungus which, in living upon the insect, had caused its death. This specimen, with many others was sent us from Livingston county, Missouri. Grubs similarly affected have been reported in Iowa and in Virginia. A dried caterpillar, bearing a single fungus, has long been known to the Chinese, who regard it as one of their most valued medicines. Recently a specimen has been sent from Victoria, Australia. This caterpillar is one that makes growth above ground, and it is only when it enters the ground to form its chrysalis that it is attacked by the spores of the fungus which always proceeds from the joint back of the neck. The body of the caterpillar was filled with a solid mass of the *mycelium*, or "spawn." When fresh, the whole was eight inches long. The insect, and three inches of the fungus, were below ground. When the fungus reaches the surface, it forms branches which bear a close resemblance to the antlers of a stag. This branched portion is solid, blackish gray in color and its surface has a granular appearance, due to ovoid growths, which are packed full of bladders containing the spores, or reproductive bodies. The fungus belongs to a well-known genus, *Cordiceps*, and was named by W. G. Smith, its describer, C. *Taylori*, in honour of its discover, the Rev. Mr. Taylor of Victoria. —*American Agricu turist.*

SUGAR INDUSTRY IN INDIA.—Representations were made to the Imperial Conference, which showed that the sugar-growing industry in the colonies and India was in great danger of being ruined if the Continental Powers could not be induced to abolish, or at least considerably modify, the excessive bounties by which they were stimulating the production of beet sugar in Germany France, Austria, Belgium, Holland, and occasionally in Russia. It was started that about one half of the total sugar production of the world is beet and that the bounties granted amount to about 3l, 10s per ton, the value of beet sugar in this country being about 12l. per ton. It was suggested by one of the delegates that as the handicap of the Continental Powers was certainly more political than commercial in [illegible] character it might be necssary for Great Britian to consider the propriety of having recourse to countervailing duties. The proposal met with very general approval. It is believed that her Majesty's Government are endeavouring to arrange a Conference of the Powers interested in the sugar question. overtures have been made to the Governments of Germany, France, [illegible]d Austria. They have not formally accepted the invitation to [illegible] but are willing to consider the question if the Conference is [illegible] embrace all countries interested. Should their preliminary [illegible] be secured, all the other Powers concerned will be [illegible] attend.

Selections.

MR. O'CONOR AND THE HON'BLE R. STEEL.

THE following correspondence between Mr. J. E. O'Conor and the Hon'ble Robert Steel has been sent to us for publication:—

SIMLA, June 20.

DEAR SIR,—In the Report of the Chamber of Commerce, received in the Department of Finance and Commerce a few days ago, I find printed at page 366, a letter from you to the Chamber, dated the 18th November 1886. In this letter you write: "Some time since the Government of India published some notes by Mr O'Conor . . . . the statistics he gives must possess authority and command attention. Now I believe that in some cases Mr. O'Conor has been misled into serious error. I will give an instance. *Mr. O'Conor gives tables of the prices of produce in the growing districts for the past 18 years, and comes to the conclusion that during that period prices generally, have rather declined than advanced.* I desired to compare his figures with some other authority, and in one instance was successful . . . . I will tell you the result. *Mr. O'Conor [illegible]s that during the past 18 years prices in the North-Western [illegible]inces and Oudh have rather declined than advanced.* Now, some months since, a Bill was introduced into the Viceroy's Council, dealing with land tenures in Oudh. Before initiating legislation the N.-W. Government made an elaborate investigation into the condition of the province. As the result of this investigation Mr. Quinton stated, when introducing the Bill, that the prices of produce in Oudh had advanced since the settlement in 1869, from 25 per cent to 30 per cent. Here is an extraordinary discrepancy which Mr. O'Conor should explain. To my mind it is sufficient to cast doubt upon all his figures."

I regret that I was not afforded an opportunity of seeing these remarks when they were written, for I think I should have been able to remove much of the misconception which manifestly exists in your mind. The explanation that I have now to give is simply that I have never made either of the two statements which you attribute to me and which I have underlined in the extract given above. I have not said that prices generally, in the growing districts of India, or in the N.-W. P. and Oudh in particular, have declined rather than advanced, and I should be glad if you would kindly refer me to any published notes of mine in which any such statement is made. There are, in fact, only two notes of mine which bear on these matters. One of these is the note on Indian Trade and Exchange, published in July last year. You cannot refer to that note, because it gives no statistic at all of prices in the agricultural districts. All the statistics therein given refer to prices in Calcutta, Bombay, and London, and the only reference to prices in the interior is a caution in a foot-note [illegible] these prices in Calcutta [illegible] not to be taken as a fair test of the general level and range of prices in the interior of India, and that no argument in regard to the value of silver in India can properly be based upon prices of exports at the port of shipment.

The other note is one on "Prices and Wages in India," published early in 1886. This note deals with the retail prices of grain in the interior, and if this is the note to which you refer, as indeed it must be, for there is no other, I am quite at a loss to discover from what part of it you drew the statements you attribute to me. As a matter of fact, the text, the tables, and the diagrams in that note, all stated the one conclusion, that prices for the period 1881-84 were on the whole higher than prices in former periods of good harvests. See the "concluding remarks" in p. 19, where I stated this fact and assigned reasons for it; see also the percentage of rise in price compared with 1876 which I worked out on p. 18, and see on several previous pages and in the tables and diagrams the results brought out for the N.-W. P. and Oudh.

Under these circumstances, it seems to me that no explanation is called for from me as to an alleged discrepancy which I cannot find, and I shall be glad to know from you where you found it.

I may add here, further, that you have misquoted Mr. Quinton. He did not mention the year 1869 at all, and it would have been very strange indeed if he had done so, for that year was a year of famine, and of famine prices in the N.-W. P. and Oudh, as you will find from the extracts quoted from the Report of the Famine Commission on p 23 of my note already referred to, and the tables of prices published annually by this department under the title "Prices and Wages in India." I would refer you to p.p. 16, 20, 24 28, 36 and 44 of this compilation of official figures (Fifth Issue, 1887, where you will find the prices of food grains in Oudh in 1869, and can compare them with those of previous and subsequent years). As copies of my two notes, and of this compilation of Prices and Wages are in the Chamber of Commerce, it is not necessary that I should send them to you for reference.

Awaiting an early reply,

I am, dear Sir, Yours faithfully,

J. E. O'CONOR.

CALCUTTA, June 24.

DEAR SIR,—I have to thank you for your letter of 20th instant.

I regret that you should have to complain that you were not afforded an opportunity of seeing my letter to the Chamber of Commerce at the time it was written, but assume this was in consequence of your absence from India. The letter was published in the *Pioneer* as well as in the Calcutta newspapers. It formed the subject of conversations between Sir A. Colvin and me, and between Sir E. Buck and me, and I naturally assumed that it would come before you.

The statements in my letter to which you now reply were founded on statistics quoted from you in Mr. Barbour's book on the currency. From your letter I understand that those figures must have been taken from your note on the subject of prices published early in 1886, which note contained some concluding remarks on the subject explanatory of your figures. I had no opportunity of seeing your note, and took your figures from Mr. Barbour's book, unaccompanied by any explanation except the following paragraph :—

"Mr. O'Conor's figures show very clearly that there has been no general rise in the price of food grains in India."

I think that you will agree with me that this second hand citation was not unreasonable, since the importance I assigned to your figures was their adoption by Mr. Barbour who represents the Indian Government on the Currency Commission, and who might mislead the Commission if supplied with unreliable statistics. I have now obtained from the Chamber of Commerce a copy of your note of 1886. I am unable to identify any of your tables with those given by Mr. Barbour, but have no doubt that the latter will be found to be the same figures differently arranged from information supplied by you. Your explanatory remarks appear to express a different conclusion from that drawn from the same premises by Mr. Barbour, but it is with the figures given by that gentleman on your authority that I have to deal.

I will now justify the correctness of my citations from Mr. Barbour's book. On page 121 he gives a comparative table of the prices of food grains said to have been compiled by you. In this table he gives comparative prices in three septennial periods, and in one concluding period of three years. You will find that the average of prices during 1868 to 1874 is stated to have been higher than during the period 1882 1884. It was on these figures that Mr. Barbour founded the conclusion quoted by me on previous page.

To these figures I opposed a statement of Mr. Quinton, and you believe that I misquoted him. The following were Mr. Quinton's words on introducing the Oudh Rent Bill, 29th of January 1886 :—

"It is calculated that since the last settlement prices have risen 25·30 per cent."

The Oudh settlement took place in 1869, and my conclusion from Mr. Quinton's speech seems to have been entirely justified.

My belief that prices have greatly risen in the North-West Provinces and Oudh is confirmed by the great advance in the value of land. The Government demand on the tenure-holders is based on the value of the produce of their land, and although I have no access to definite figures, I learn on high authority that the settlements now going forward in the North-West Provinces show an astounding increase in the value of land.

I never doubted that the figures you gave were compiled from the best source at your command, but I am satisfied that the [illegible] quoted from you by Mr. Barbour would form a most unreliable [illegible] Commission.

It [illegible] that the correspondence should be published, and if I have your permission will send it to the newspapers.

I am, Dear Sir, yours faithfully,
ROBERT STEEL.

J. E. O'Conor, Esq.

SIMLA, June 30.

DEAR SIR,—I beg to acknowledge receipt of your letter of the 24th instant, in which you seek to justify the reference made to me in your letter to the Chamber of the 18th of November, 1886.

To make the case clear, it is necessary that I should recapitulate the substance of the reference. You said that the Government of India had published some notes by me, and that in the statistics I gave in these notes I had committed serious errors, sufficient in your opinion, to cast doubt upon all my figures. You gave but one instance of these errors. It was this: that I had given tables of the prices of produce in the growing districts for the past 18 years, and had come to the conclusion that, during that period, prices generally had rather declined than advanced, and you further attributed to me the statement that, "during the past 18 years, prices in the North-Western Provinces and Oudh have rather declined than advanced." You proceeded then to refute this alleged specific statement of mine, as well as the previously alleged general statement, by a quotation from a speech by Mr. Quinton, whom you represented as saying when introducing the Oudh Rent Bill, that the prices of produce in that province had advanced since the last settlement in 1869, from 25 to 30 per cent.

In reply to my request that you would inform me where in either of my two notes published by the Government of India, you had found the statements attributed to me, you refer me to Mr. Barbour's book on the Theory of Bi metallism. Allow me to observe, then, that you did not find those remarks in any notes of mine published by the Government of India. And I will further remark that you do not find them, or anything like them, in Mr. Barbour's book. In chapter XXII. of that book there are certain tables which I compiled, but these tables are not, as you represent them, tables of prices for the last 18 years. They are tables of three septennial averages commencing with 1861, and a triennial average ending with 1884. The price of no single year is given, and the whole period embraced is 24 years. There is no statement in the chapter or anywhere else to the effect that I had drawn the conclusion that prices had declined rather than advanced; or indeed, that I had drawn any conclusion of any kind from them. Mr. Barbour's conclusion drawn from the figures which I furnished to him also was different from the purport you ascribed to it. He states in the chapter mentioned pp. 120-127, that the general question of the rise or fall in prices in the interior of India is one of much difficulty, that the course of export prices would not justify the opinion that there had been any "considerable rise" of prices in the interior, though the spread of railways would tend to raise the average by raising prices where previously there had been no market for produce; that my figures showed that there had been no "general rise" of prices, the very good harvests of 1882 83 84 having, by cheapening grain, counteracted the effects of the opening up of districts which formerly had no means of export; that for these reasons the prices of food grains are not higher than they were, this being in some measure due to the good harvests of recent years; and his final conclusion was that the fall in the value of silver, as compared with gold, had, up to the time he wrote, not had any considerable effect in raising prices."

This is very different from stating that there had been a decline rather than an advance in prices, and having demurred in my letter of the 20th to your attributing such a statement to me, I may now demur to your attributing it to Mr. Barbour.

I have only to add in respect of this particular statement that my inability to discover where you could have found it is easily understood. You referred in a letter of November 1886 to conclusions drawn by me in notes published by the Government of India, whereas it now turns out that you referred to certain tables published without note or comment from me in a book which was written by Mr. Barbour in 1885, from which tables *you* drew an inference which you attributed to me. I have only to add here, that in my opinion your inference is wrong. My own opinion has been stated in the little book to which I have already referred you. Substantially it agrees with Mr. Barbour's conclusions.

As regards the testimony of Mr. Quinton, touching the advance of prices in Oudh since 1869, allow me to say that if you will refer again to the proceedings of the Legislative Council of the 29th of January, 1886, you will find the facts to be these: Mr. Quinton quoted from a report by Major Erskine, written in 1883, in which it was stated that the rent in 15 years, that is from 1868—had risen, but that prices also had, since the last settlement. This was one of the points which Mr. Quinton stated was established by Major Erskine's report of 1883 The settlement was not made in 1869, as you suppose. The assessments went on in the twelve districts of Oudh from 1863 to 1875, and most, if not all, of the assessments of the Province were revised in 1873-75. Of the original settlement, I find that only five districts out of twelve had been completed up to Semptember, 1871, and up to September, 1872 only eight had been completed. It is evident, therefore that Mr. Quinton did not say, and could not have said, that prices had increased 25 to 30 per cent. since the settlement of 1869, though I confess I have not discovered from what datum period the rise of price was calculated, or on what data the calculation was based. I need only add perhaps, here, that no person who knows what was the agricultural condition of Oudh, and the level of prices in 1869, could possibly make the statement you attributed to Mr. Quinton, that prices had increased 25 to 30 per cent since that year.

Having shown that no single statement made in your letter of the 18th of November was in accordance with the facts, I regret that I am now compelled to demur to your assumption in the letter under reply that the figures given in Mr. Barbour's book were likely to mislead the Royal Commission on currency. As those figures (if they were placed before the Commission) were accompanied by an inference drawn from them by Mr. Barbour, which was entirely different from the inference suggested by you, and as the commission had also before it all the data from which those averages were struck I do not quite see why you should assume that there was a risk of leading the commission astray. If you had informed yourself of the facts you could not have made the assumption. The facts are these: When I began my enquiry into prices in India, the first step was to test the accuracy of the figures which are published fortnightly by the Government of India. This was done as far as possible by comparison with prison and commissariat prices, by reference to trader's books, and by comparison with tables of prices in administration and other reports. These tests extended over a considerable time, and in the result the figures were found to be upon the whole very fairly correct. Their correctness also appeared from internal evidence, the variations corresponding closely with known seasonal phenomena, and with facts that might reasonably have been expected as a result of bringing places without a market into communication with markets in and beyond India.

The next step was to compare the average of one period with another. This work was not simple or easy. I had 24 years to de[al] with, when I commenced the work in 1885. The first division I ma[de] was to compare the last three years with the previous 21 years, whic[h] I divided into three periods of seven years each. I then arranged th[e] periods differently, and compared the last four years with the previo[us] 20 years, (1) as a whole; and (2), in five groups of four years eac[h]. I also compared the prices of 1884 and 1885 with the prices of oth[er] years of good seasons and low prices, such as 1862, 1863, 1864. 187[?] 1876, and especially I compared the prices of 1884 and 18[85] with those of 1876, a year of very low prices. I gave the prices [of] every year and constructed diagrams which showed the variations [of] prices of the principal grains in the principal provinces from year [to] year. Further, not content with the provincial averages, I afterward[s] in 1886, worked out the prices year by year at 15 principal stations f[or] 25 years, with quinquennial averages and the averages for the 20 year[s] previous to the last five years. I also took 17 principal stations, a[nd] for these gave an average price for the principal grains for a perio[d] of 12 years, 1861—1872, and a second period of 13 years (1873—1885 the commencement of this second period being also the commence[ment] of the great divergence in the relative values of gold and silve[r]. In this latter series I also reduced the figures of quantity per rup[ee] (the Indian method of expression) to annas, *per seer* (the Engli[sh] method) showing both in the table in different type. All [these] tables were placed in possession of the commission, which ha[s] had the price from year to year since 1861, at each of the [illegible]

tions from which the Government of India has for many years, received the fortnightly return of prices which form the foundation of all the work that has been done in this direction. If, as I have said, you had informed yourself of these facts you would I do not doubt, have refrained from assuming that the commission was likely to be misled or (as may be inferred from your remark) that I, or anybody else, would propose to mislead it. Your right to contest conclusions or opinions which do not agree with your own, cannot be denied, but if you propose to contest facts and discredit figures because they do not square with your views, the first and indispensable step to take is to possess yourself fully of the facts. I gather that you know nothing of the facts, though you certainly might without trouble have informed yourself of them, and in the circumstances I am compelled to say that your imputations of inaccuracy, and your assumptions, are as surprising as they are unjustifiable.

I have only to add that all the different methods I adopted of averaging prices, brought out substantially the same results, and that, if you contest the results I shall be glad to see your argument, provided they are founded on a solid basis of fact

As regards the concluding paragraph of your letter, touching the astounding increase in the value of land in the North-Western Provinces, I must ask permission to reserve my opinion until I am acquainted with the facts, and learn where that increase has taken place, what is the actual increase, and what were the causes which led to the increase.

I shall be glad if, as you propose, you will publish this correspondence; I had intended to publish it myself, but I will leave it to you to do so.

I am, yours faithfully,

J. E. O'Conor.

Calcutta, 4th July, 1887.

Dear Sir,—I have to acknowledge receipt of your letter dated 20th of June.

This letter contains details concerning your statistical work, which may possess some value as a defence of your personal reputation, but it will not remove the doubts which have been cast on the accuracy of your figures. So far as the controversy is personal to yourself it has no interest for me or for the public. I claim the right to criticize in my own way statistics prepared by you as a public servant at the public cost, provided I do not misrepresent those figures.

The table of prices of food grain quoted by Mr. Barbour speaks for itself. It shows, if correct, that prices have fallen rather than advanced during the last 18 years. It is followed by a paragraph in which Mr. Barbour specially draws from it the conclusion that there has been no general rise in the price of food grains. To this distinct allegation I found a contradiction in a speech made by Mr. Quinton on the authority of the North-West Government. He said that prices have advanced 25 to 30 per cent, since the settlement. You say I am mistaken in giving 1869 as the date of the Oudh Settlement. I [illegible]n, but I beg to say tha[illegible] argument, My only object in mentioning 1869 [illegible] bring your figures into a line with Mr. Quinton's statement, and I had been informed that 1869 was the date of the Settlement. It is perfectly immaterial for the purpose of my argument when the great rise in prices took place. If it has taken place at all since 1868, it distinctly proves the inaccuracy of your table.

I will send this correspondence to the papers for publication. I regret, on your account, that your last letter is pitched on a key which may appear unsuitable and uncalled for.

I am, yours faithfully,

Robert Steel

J. E. O'Conor, Esq., Simla.

SOME NEW ROSES.

I do not mean to enter upon any prophetic declarations as to the Roses that are coming out—they have been heralded as usual by loud trumpet notes, and every adjective that can express excellence in the French language has been applied to them, and indeed in some instances they have surpassed themselves, as one is described as having the appearance of a burning bush, and another as very "ocquettish" I would rather refer to some that have not been generally seen but of which expectations have been formed, and towards which many critical eyes will be turned during the Rose-showing season. They have been more or less seen during the past season, and while many hopeful expectations have been formed about them, a further test is required before they are admitted to the position of established show varieties. In taking the hybrid perpetuals first, I find among them some, of which many Rose growers have already spoken well.

Edouard Herve (F. Verdier fils). This has been well spoken of by that good and somewhat particular rosarian, Mr. B. F. Cant, of Colchester; it is described as currant-red, shaded with crimson, very vigorous and sweet-scented; Dr Dor (Liabaud), shaded red, very large, full perfume and form of the Tea Rose, very vigorous, and free-flowering; this [illegible] suggestive rather of what are called hybrid Teas. General Apper[illegible] (Schwartz), velvety-purple, red shaded, large and full, very vigorou[illegible] blooming well in the autumn; a seedling from Souvenir de Wm. [illegible]ood; but as this is a Rose of which we know [illegible] little, we do [illegible] gain much by the knowledge. Clara Cochet, on[illegible] Lacharme's [illegible]dlings, comes from a raiser who has not only sent us [illegible] of the [illegible] Roses we have, but has sent us very few bad ones. [illegible]re are [illegible] French raisers who do indeed send us some good [illegible], but [illegible]erally frieght them with a number of others which are [illegible]ply ball[illegible], and like ballast have to be thrown overboard, when a [illegible] cargo is taken on. This is one [illegible] those light-coloured Roses of [illegible] Lacharme has already sent [illegible]od examples in Captain Christy [illegible]d Catherine Soupert. This [illegible] from the description to be in [illegible]vance already mentioned; it is very vigorous and probably will require careful management as to pruning.

Turning now to British raised Roses of this class (I use term advisedly, because some of them came from Ireland), we are standing on somewhat safer ground. We have had the opportunity of seeing these, and can judge from our own observation and from our conclusions, even although we may have to modify them. Messrs Alexander Dickson & Sons, of Newtownards in the county of Down, have been for some years engaged in hybirdising Roses, and are now letting out the first fruits of their labours. I know them to be thoroughly honest and upright men and have every confidence that they would not palm off on the public anything that they thought to be inferior; of course there is always the danger of overestimating the charms of our own "belongings," but, then, when a Rose (Earl of Dufferin) has received seven First-class Certificates, and has been picked out as the premier Rose from amongst 1,250 blooms, it is clear that there must be something in it. Messrs. Dickson have sent out a portrait of it which, independently of the merits of the flower, is one of the best Rose plates I have seen. It is a splendidly coloured dark Rose, suggesting perhaps, A. K. Williams in its blood, is said to be very vigorous, free, and a good autumnal bloomer. Another Rose of the same style; but a seedling from A. K. Williams, is a Grand Mogul sent out by Messrs. W. Paul & Sons, is undoubtedly a flower of great merit. Its brilliancy of colour and exquisite shape are points which are sure to [w]in it favour with Rose growers. Her Majesty (Bennett) is a Rose [wh]ich is doubtless in the possession of most Rose growers by this [t]ime, and will probably be largely exhibited this year, *i.e.*, if growers have been careful not to prune it too hard. We shall probably hear much of it during this season, and shall be able to determine more about it when the season ends. Mrs. John Laing, by the same raiser, is a bright flower of the character of Mons. Noman. It was regarded with great favour when it took the Gold Medal of the National Rose Society. Puritan, another Rose of the same raiser, is remarkable for the length of time it remains in bloom; it is somewhat suggestive of the Merveille de Lyon style of flower. Another Rose reaches us from America under the utterly misleading title of hybrid Tea, called American Beauty, but a writer in one of the gardening papers states that it is an old flower with a new name, *viz.*, Madame Ferdinand Jamain, sent out by Ledechaux, in 1874; if this be so, nothing can more forcibly show the absurdity of making this confusing class of hybrid Teas as that Rose has been for ten years or more included amongst hybrid perpetuals, as in truth all these hybrid Teas must be.

Although a number of Tea Roses have been announced during the last two years, the real additions are few. Again has the veteran grower Guillot, to whom we owe so many fine Roses of this class, sent us one which promises to be a useful addition to those we already possess—Comtesse de Ingreuse; its colour is a pure yellow, and as the flowers are large with broad petals, it is likely to be a useful Rose, even taking into account the many good yellow Roses [illegible]ady possess. Messrs. [illegible] right; I [illegible] which they describe as of a very robust habit; colour, salmon pink, shaded yellow at base of petals. Messrs. Dickson sent me the other day blooms from plants which had been grafted in February; they were small of course, but, as well as could be gathered from their condition after their long journey, it is a good flower of great substance, and bright in colour. A Tea has reached us from America which has been received with much favour; it is a sport from Catherine Mermet, the pink of that Rose being replaced with white, and a slight *soupçon* of primrose at the base, about as much as we see in Gloire Lyonnaise; a box of it was exhibited this spring at one of the Royal Horticultural Society's shows by Mr. D. Gilmour, junr, and was greatly admired; but the general opinion, I think, was that as a white Tea Rose, Niphetos still holds the palm. There may be other Roses which may come to the front, but I think these will be amongst the most noteworthy.—*Wild Rose*, in *Gardners' Chronicle.*

GINGER AND GINGER BEER ADULTERATION.

The extensive use of spent Ginger for the purpose of adulterating ground Ginger, or of being substituted for the latter, has it appears, led to even lower depths of adulteration, A new industry has sprung up by which a foreign or extraneous heat is given to ginger of which the goodness has been removed in the manufacture of ginger beer or other drinks or condiments. An infusion is made from chillies or capsicums, and the spent ginger is soaked in the liquor with the result of course, of giving any amount of heating properties that may be desired, and at a trifling cost. The ginger is then put through a drying process and afterwards ground, but as there are no visible particles of chillies or capsicums, the adulteration cannot be detected except by an analysis which shall differentiate the extractive properties of ginger from those of Cayenne. It would have been thought that such frauds were not worth perpetrating because the trade is so small, but if these worthless mixtures can be palmed off on the grocers at the price of good ginger, the profit on a wholesale scale would be very great indeed. The ginger trade is suffering greatly in another direction through the demand for cheap aerated drinks, coupled with the desire for increased profits. A decoction of the essence of chillies or capsicums is ma[de], which is so strong that a drop placed in the hand blisters it. This essence is substituted for ginger, but the product continues to be labelled as ginger beer, though no ginger is used in the manufacture. This probably accounts for the extraordinary compounds occasionally supplied under the name of ginger beer—a drink which when genuine, is wholesome and pleasant; but which, as now often supplied, is the reverse. Surely the coats of the stomachs of the public generally, or even of total abstainers, do not require the stimulus of blistering liquids of this sort, but if they do, they should be supplied under their true name, and not take upon them the name of ginger.—*Produce Markets' Review.*

INTERCULTURAL TILLAGE.

The explanation of the efficacy of stirring the soil about growing plants is based on the loosening and breaking up of the soil particles, in order to facilitate the progress of the roots, and admit the air which oxidises organic matters, and acts on the mineral substance so as to liberate the plant-food, to change the physical conditions of the soil with respect to evaporation and absorption, and, it may be added, to change mechanically the position of the plant-food within the interstices of the soil, and to facilitate the production and growth of roots. Intercultural tillage, therefore, is beneficial, because it pulverises and stirs the soil, and because it breaks or prunes the root, and facilitates the production of new ones, and thus has a physiological influence on the plant.

Breaking the roots gives a check to the growth of the plant, and tends to change the character of its growth. Thus intercultural tillage must be timed to the necessities of the plant. It is a means to an end, and judiciously employed promises much benefit. A drought which comes so seasonably as to check leaf-growth at just the proper time, or a springtime which with a hot sun by day to warm the earth, has cool nights to retard the night's growth, acts in somewhat of a similar manner. Another consideration; an excess of manure tends to hasten leaf-growth, especially if the manure is strongly nitrogenous; and hence if the plant be left to itself growth becomes rank, and there is little production of flower or fruit. If, however, the growth be properly checked, then the forces of leaf-growth are diverted to the production of flower, seed, and maturation.

As an illustration, we can cite the Cabbage, which, in poor soil and in dry and hot seasons, will throw up prematurely the inflorescence due in ordinary course the following year. And even in rich soils the Cabbage may be caused to break its head and send out a seed stem, by judiciously checking its growth. The importance of these facts has long been recognised by horticulturists.

Thus, under the head of "resting," Lindley states, "that the effect of a very dry atmosphere is to inspissate the sap of the plant, and this in all cases tends to the formation of blossom-buds and fruit. Very low temperatures, under the influence of much light, by retarding and diminishing the expenditure of sap in the growth of plants comparatively with its creation, causes an early appearance of fruit." Again, "Whatever produces excessive vigour in plants is favourable to the formation of leaf-buds and unfavourable to the production of flower-buds; while on the other hand such circumstances as tend to diminish luxuriance and to check rapid vegetation, without affecting the health of the plant, are more favourable to the production of flower-buds than of leaf-buds."

It is quite evident that all plants must either send their roots to the food in the soil, or the food must go to the roots, or the two processes must be combined. In the passage of water in the soil we have an agency for the disturbance of the relations of the food supply.

—plant which occupies with its feeding roots the largest extent of soil that plant whose roots fill the most interstices of the soil, must, other things being equal, have a greater command over the food supply of the soil. In root-pruning many plants we cause the main roots to divide, and send out more numerous small fibrils and root hairs than existed on the root that was cut away, and we thus give that plant a greater access to the food supply of the soil than it previously had; just as, for illustration, we can increase the leaves on a given area of a hedge, by a system of pruning which shall cause increased multiplication of branches within that area.

But on all plants the beneficial effects of root-pruning and interculture would seem to be more marked on fertile land than on poor soil, or even on land in ordinary condition. In all cases it should be applied according to the physiological requirements of the plants with which we have to deal.—*Gardeners' Chronicle.*

THE NATURAL GAS OF AMERICA.

In an article in the *Scotsman* of 10th December last, upon the Development and progress of the iron and steel trades in the United States, "a passing comment was made upon an important and powerful factor which has recently been brought into play in that country, and to which it may be interesting to refer at greater length—viz., natural gas.

"Tell me" (said the writer of this article to an intelligent and sociable American with whom he became acquainted on the outward passage) about your natural gas." "Well, sir," replied he, there's not much to tell. You bore a hole in the earth, stick in a tube and blaze away." "Do they not store it and control it as we do with manufactured gas." "Oh bless your heart no; there's such a lot of it, it's not necessary—it would be useless expense." This somewhat rough and ready description is in its first assertion not far from the actual fact. A visit to the district where this wonderful product is procured and consumed acts upon one like proofs of a new revelation from the unseen. The first signs a stranger observes are tubes of six or seven inches, sometimes even larger, in diameter, and twelve to twenty feet high, blazing night and day without any apparent use. These are escape valves, as they may be called, which are inserted to relieve the enormous pressure of the gas upon the pipes used to convey the gas to the places of consumption, and it is burned to prevent injurious effects—all the more dangerous as the gases from some wells are almost entirely without smell. At night the appearance of these great torches is very fine, the district being lighted up for miles around by their fierce and unceasing flames.

The gas is found in the earth at depths varying from a few feet to over 2,000 feet. The pressure of this natural gas in the ground is very great—some estimate it at 2,000 to 4,000 lbs. per square inch, so its pressure is soon felt when the drill sets it free.

"How do you know," said the writer to one of the workmen engaged in boring—"how do you know when you come upon the gas?" "Well," said he, "had you been with me a few weeks ago when we were boring so-and-so, well you would have seen drill tubes and every thing sent flying up into the air; and right glad we were when we got a heavy tube firmly fixed." Such instances are very common. The chairman of the Engineer's Society of Western Pennsylvania, described the noise of the gas escaping from one well near Pittsburgh, as greater than that made by 50 locomotives blowing off steam.

The gas is carried in iron pipes of great diameters into the different places of consumption, where the pressure is controlled and manipulated. As done in one of the well-managed rolling mills —and they are nearly all well managed—the gas was brought in at a well situated corner, being controlled as it entered into a large reservoir; there again the pressure could be controlled as it entered the distributing pipes, to be carried to the different parts of the works; and again each puddler could regulate the pressure as it entered into the furnance; and naturally the other class of workmen could do the same for their respective purposes.

The puddlers regard it as an enormous advantage, being easier worked and giving a larger yield than coal; and practical iron-workers maintain, what is now universally admitted, that the iron made by natural gas, all other conditions being the same, is much superior to that made by the ordinary process. It is claimed that this is the result of the chemical action of the properties of the gases which, however, it is not the object of the present article to discuss; but certainly, an examination of some sheets, bars, and skelp iron made out of by no means high-class material, showed a superior quality of iron.

It is employed not only for puddling, but with advantage, for firing boilers, tube making, here the ... purposes in iron and steel manufacture where heat and light are required for all purposes, except one and that exception is an important one, being the smelting of iron in the blast furnace. The charge in the blast furnace becomes too solid with the smelting heat playing only on the outside of the mass instead of being uniformly diffused through it as with coke or coal. But this is a difficulty which no doubt will soon be overcome, as so many difficulties have been, and thus another powerfull factor will have to be added to the already "great array of triumphs" by means of which our American brethren have achieved the marvellous progress in the industries of their country.

The two chief advantages in addition to the better quality of the iron are cheapness and cleanliness. There is, naturally, an enormous saving of labour in handling the combustible, and in feeding the fires. In one large work what resembles a street of boilers is attended by a man and a lad. In this work the services of 140 men were dispensed with the first day the gas was fairly in use. There is no "cleaning up," no removing, and transport of ashes and refuse, which form an important item when ordinary fuel is employed. In addition to these important savings, the difference between the two fuels is 40 to 55 per cent., and in some instances even 60 per cent., in favour of gas; and it is claimed that the increased yield is equal from 15 to 25 per cent. Under its use in one steel plant it was found that, where formerly it had taken 96,000 dols. worth of coal to produce 12,000 tons of steel, with gas only 40,000 dols. were required for the fuel cost, and a further saving was made of 12,000 dols. in the cost of hauling the ashes and coal. A close observation demonstrated also that there was a saving of about 25 per cent. in the wear and tear of the furnace, in the use of gas instead of coal fuel.

It is seldom sold by so much per 1,000 feet, but it is either bargained for according to the work to be done, or on a basis of the cost of the coal formerly used in the work, much naturally depending on the bargaining capacity of the consumer, but many of the works have gas-wells of their own.

It is naturally easy of transport, being conveyed in pipes underground immense distances. The account appeared a few weeks ago that "Buffalo's pipe line had been completed from the Pennsylvania gas field to that city a distance of between eighty and ninety

miles, natural pressure only being used, and the gas reaching Buffalo and flaming to the height of eighty feet through an eight-inch opening pipes were at once laid throughout the city."

Only between three and four years ago the stranger, on approaching Pittsburgh—that marvellous industrial city which has sprung as if by a single and sudden bound into the foremost ranks of scientific and productive pre-eminence,—of which nearly every description contains in one set of words or another, Mr. G. H. Thurston's bold and somewhat justifiable remark, "Pittsburgh stands to-day the most noted city of the world."

"Standing a giant athwart the head waters of the Ohio—glowing with the blaze of hundreds of furnace fires, swart and grimy with their smoke—Pittsburgh, proud of her past, and looking with confidence to her future, may well sing as the

SONG OF PITTSBURGH,

I'm Pittsburgh, the city of iron and steel;
The forces of earth lie bound at my feet,
Where the might of muscle, the brain of skill,
The powers of nature in harmony meet.
I've grasped the ores of the mountain side,
I've seized the vapours of primeval earth;
My skies are red at the mirk of night
With fires wherein the world had birth."

And so on, through further fifty-six lines of terse though somewhat technical verse.

Well the stranger only these limited years ago, on approaching this great city by one of the heights by which it is surrounded, might for a moment have felt as if once again the divine judgment had fallen upon another City of the Plain, for literally "the smoke of the country went up as the smoke of a furnace," and the valley was shrouded for miles in a pall of impenetrable smoke. Now the use of the vapour fuel has poured on it almost the glory of a new complexion. Standing on the bridge which spans the Monongahela River, and looking up the valley, it is filled indeed with a white vapour, but the puffing little tug boat 20 horse power, about to drag a few barges down the river emits more smoke than all the colossal works producing daily thousands of tons of iron and steel in all the various stages of finish and variety of form.

It is not only in the iron and steel trades however that the ...n glass-making and various other manufactures, whilst in hotels and many private houses coal is entirely superseded by this newly applied and preferable substitute. I say newly applied, for the commodity itself is by no means new. Without stopping to "question or dispute," the fact of this vapour fuel having been discovered and used at the oracle of Apollo, in Delphi, some 1,000 years B C, it has certainly been used for several centuries in many places both in Europe and Asia; whilst legends tell of the red man of America smoking his pipe by the favouring light of the burning springs ages before the white man landed upon his shores. The well-known burning springs at the Niagara Falls, only recently extinct, perhaps only obstructed, as has often been found to be the case when gas wells cease to act, will be in the memory of every visitor to that district. Mr. Emerson M'Millan, the well-known American chemist, and one of the chief authorities on natural gas, says:—"I was used at a very early day in the Kanawha Valley for the evaporation of salt water. In a letter recently received from the proprietor of the gas works at Fredonia N. Y, he tells me that the gas has been in use there for more than sixty years; that it is necessary to drill only 100 to 300 feet in order to obtain it; that some fifteen wells, mostly of recent date are in use, and that increasing the number of new did not appear to diminish the supply in any of the old wells."

In Pittsburgh, the great centre of the natural gas consumption, first practically applied to any considerable extent in 1875 6, its general adoption only took place about the middle of 1884, and so rapid was the transformation that within two years one company alone supplied between 30 and 40 iron and steel works, over 60 glass works, and 300 to 400 smaller factories and hotels, and during last year the rapid extension has continued.

Two important questions are—How is this gas formed? and, Is the supply likely to continue?

It is not within the scope of this article to discuss the various theories of its formation. Many indications point to its vegetable origin and the theory may be stated briefly thus:—

Geologists inform us that at the close of the Silurian Era the earth began to bring forth vegetation. At that time great salt lakes are said to have existed on the American continent, from the Appalachian chain westward. As years advanced that section of the earth gradually uprose; leaving what have been called Devonian lakes, the Devonian Era having succeeded this period. These salt Devonian basins, filling up with slime and mud, formed fertile marshes, and gave birth to luxuriant and rank vegetation—some fossils showing that these resinous plants grew to at least 100 feet high; and these, having been under pressure and distillation for ages, now re-appear in the beneficent forms of gas and oil.

...ferring to this theory Mr. G. H. Thurston observes:—

"At that date one theory is that the earth was a vast hot-house, ... in a dense atmosphere of carbonic gas; and the great internal heat of the earth at that time created a more than tropical climate, which stimulated the vegetable growth to gigantic proportions, and under the intense heat they absorbed from the atmosphere great quantities of carbon, which combining with the saline nutriment of their roots caused the secretion of rich oily juices. Under such an atmosphere animal life was impossible; and unbroken by aught, this vegetation which was probably the most enormous that the earth ever produced, must have filled the huge marshy basins in which it grew to an almost solid mass. It is geologically claimed that in the Devonian period there were submergencies of the Apalachian region and successive periods of vegetable formations of similar character thus forming many layers of this resinous vegetable matter, from which a distillation through internal heat was consequent. It is not difficult to believe such an enormous bulk of oily plant. submerged and covered with great depth and weights of silt, and thus compressed between the heated rocks beneath and the sand silt above, would be practically in a retort, and their oils distilled."

Perhaps it may be interesting and useful here to give the analysis of gases from several different wells which with the exception of Nos. 10 and 11 (Findlay Wells), are taken from the report of the Engineers' Society of Western Pennsylvania:—

				Carbo Oxic	Nitr		Illuminat'ng Hydro-carbons.	Sulphuretted Hydrogen.	
	82·41		10·11	—	4·81	4·23	2·04	—	
	96·50		—	0·50	—	2·00	1·00	—	
6·1	75·44	18·12	0·34				—	—	
13·50	80·11	5·72	0·66				—	—	
27·56	60 27	6·80	2·28		7 32	0·83	—	—	
19·55	78·24		—		—	2·20	—	—	
	—		15·56				—	—	
	47·87		3·10		47·39	0·17	—	—	
	93 09	—	2·18	—	0 49		3·20	—	
	96·49	—	0·58	1·50	—	—	0·50	0·82	0·25
	85·000	—	0·150	3·375	10·200	2 700	—	0·368	0·110

Numerous other analyses are easily obtainable, but the above are sufficiently numerous to enable one to form a fair idea of the various qualities of these natural gases.

Mr. Emerson M'Millan in one of his excellent brochures, says:—

"It is generally conceded that natural gas is generated from the carbonaceous material of the deeply buried shales. There are many, however, whose opinions are worthy of consideration, who believe that the oil sands are the real producers, and still others who believe that the oil and gas come from the limestones. I think incontestable proof can be offered that all are right; I believe that the gases of the Devonian system come chiefly from the shales but not exclusively. The corniferous lime at Chicago and Terre ...te are producers. The advocates of the idea ... natural gases and oils, have many facts to back up their theory, yet I am not sure that they have made out a clear case. To determine this point definitely, it will be necessary to particularise a little more as to the real origin of the carbonaceous matter. What is it? Was it vegetable, similar to that which produced coal, or was it sea-weed *debris*? Or was it animal and not vegetable? Or was it both animal and vegetable. Or was it neither animal nor vegetable, but chemical? Instances may be cited in which an affirmative answer might be given to each of the inquiries. That the gases obtained from the Trenton, Niagara, and corniferous limestones are animal, admits no room for doubt in my mind. That the gases of the Utica shales, the Huron shales, and of the sandstones of the coal measures are partly annimal and partly vegetable seems equally probable. That the gases of the volcanic regions are chemical may readily be believed"

Dr. Newberry in the "Ohio Survey" says the Cuyahogo shale "is crowded with its characteristic mollusks, and with the bones, teeth, scales and spines of fishes;" and of the Berea-grit "it contains in large numbers the spine, and teeth of fishes. Of those the most conspicuous are the spines of a species of Ctenacanthus (Ct triangularis), of which more than *two dozen* were found upon a surface not larger than a square yard." Innumerable quotations could be made from Dr. Newberry's Ohio report, not only to show that in many cases this gas-like oil is formed largely from animal matter, but also to show what is of infinitely greater importance, that some of the sandstones not only serve as store houses, but are actual producers of this valuable commodity.

One thing is certain that so far, notwithstanding the great number of wells, and the enormous volume of gas drawn off every day, the supply shows no signs of decreasing. Here and there a well slackens and sometimes ceases, though even then it has often been found that the flow has merely been obstructed by some deposit, such as paraffin, lime, magnesia, or salt; but, practically speaking the supply is increasing rather than diminishing, and bids fair to become another powerful factor in developing the great and splendid mineral resources of America.

The suggestion may arise, does this desirable fuel not exist in our own country? A well-known and experienced gas and oil explorer, who recently spent a few days in this country, expressed to the writer a decided opinion in the affirmative, and was ready, against the guarantee of a certain sum, to discover it. Negotiations went no further. The writer felt that, if it really were so, this "gem of purest ray serene" would not long be allowed to remain dormant and useless in the fathomable depths of earth, in a country which may be considered the birthplace of the iron and coal trades of the world; which long stood unrivalled in mining and industrial research, and is still leading the van in the newest developments of steel manufactures.—*Scotsman*.

OUR DIGESTION.

"To speak tersely, [illegible] that cooked starch may be digested in the mouth ; [illegible] (albumens) in the stomach, and starches, meats, and [illegible], in the intestines.]

"*The Saliva.*—The digestive power of [illegible] is due to a ferment called ptyalin, which it has been [illegible] will [illegible] 2,000 times its weight of starch. If [illegible] boiled starch, about as warm as can be comfortably retained in the mouth, a very little saliva can be added, the starch will be liquefied [illegible], and in little time be converted completely into, what is called maltose (or malt sugar). While it has been supposed and taught by many that the saliva has very little to do with digestion, we begin to see that it has a good deal to do with it. For instance, we have seen people with dyspepsia caused by indigestion of starch [illegible] who bolted their food) greatly relieved of their distress by the simple expedient of chewing gum and swallowing the oral secretions.

"As soon as starch is converted into sugar it can be absorbed at once by the veins, carried to the liver, and appropriated to keep up the heat and force of the body. If the food has been hastily eaten, much of the starch—as in bread, potatoes, greens, &c.—will not be even liquefied (to say nothing of being digested,) by the saliva. A large proportion of our daily food is farinaceous ; some of it is more or less indigestible, requiring complete mastication before it can possibly be much affected by the ferments. When the food is masticated (or chewed) properly there is a free flow of saliva, action of which continues for a time in the stomach ; the starchy portions are liquified by it as by magic, malt sugar is formed, and a good share of the meat is soon ready for absorption. But when the food is not masticated properly, all these benefits are lost, the starchy matter lies hard and heavy in the stomach (which does not digest starch, but meats), requires a long time before it is even moistened, to say nothing of its being dissolved, and a couple of hours may elapse without any of it being absorbed. So is the digestive process impeded.

As more amylaceous food is taken than any other, so is it a very pregnant source of digestive derangements, though this is not as universally recognised perhaps as it should be. Many a case of chronic diarrhœa and flatulence is directly due to the faulty digestion of starch. This is shown by the fact that so many are relieved by the digestive ferment (or diastase) in aqueous extract of malted barley, as the Malt Extract.

It is well known among physiologists that during the first two [illegible] the end of the first year of life is the flow of such ferments fully established. Hence can we account for the saying of Professor Liebig, that "one-half of infant mortality is due to farinaceous food."

To obviate the dangers and still comply with all requirements as the child grows older, Professor Liebig recommended the vegetable ferment (or diastase) and malt sugar to be added to the milk ; in this way he greatly increased the nutriment of the child and guarded against every mishap. Says Dr. Fothergill : "To utilise the digestive ferment of the embryo plant for the necessities of the human infant was a step forward in the treatment of defective nutrition. A good Malt Extract like Kepler's, or Wood's, will liquefy a plate of gruel in a moment. The harm that may arise from improperly administering starchy foods, as bread, gruel, &c., in typhoid fever, peritonitis, gastric and intestinal ulceration, dyspepsia, diarrhœa and many other affections is oft times considerable ; while the dangers attendant upon the custom of giving infants [illegible] food have been fully recognised, and unqualifiedly condemned, by scientific authorities. In a very weak stomach, and in diseases of the stomach, every form of food that is not easily digested and passed out of that organ sets up injurious consequences."—(Siemens.)

Dr. Chambers says in his excellent Manual of Diet in Health and Disease [illegible] at the latter end of meals certainly generates an excess of [illegible] and is to be avoided. But yet, in moderation, it [illegible] (as observed by [illegible]) the flow of gastric juice, so that the custom observed by Oriental nations of taking a few bon-bons and sweets, is in accordance with reason, and might prudently be experimented on in this country." Far superior to these sweets would seem to be the maltose above referred to, for it is the natural form produced and absorbed by the [illegible] organs, and combines the advantages of valuable and [illegible] with 'force-producing' and 'tissue-forming' materials.
